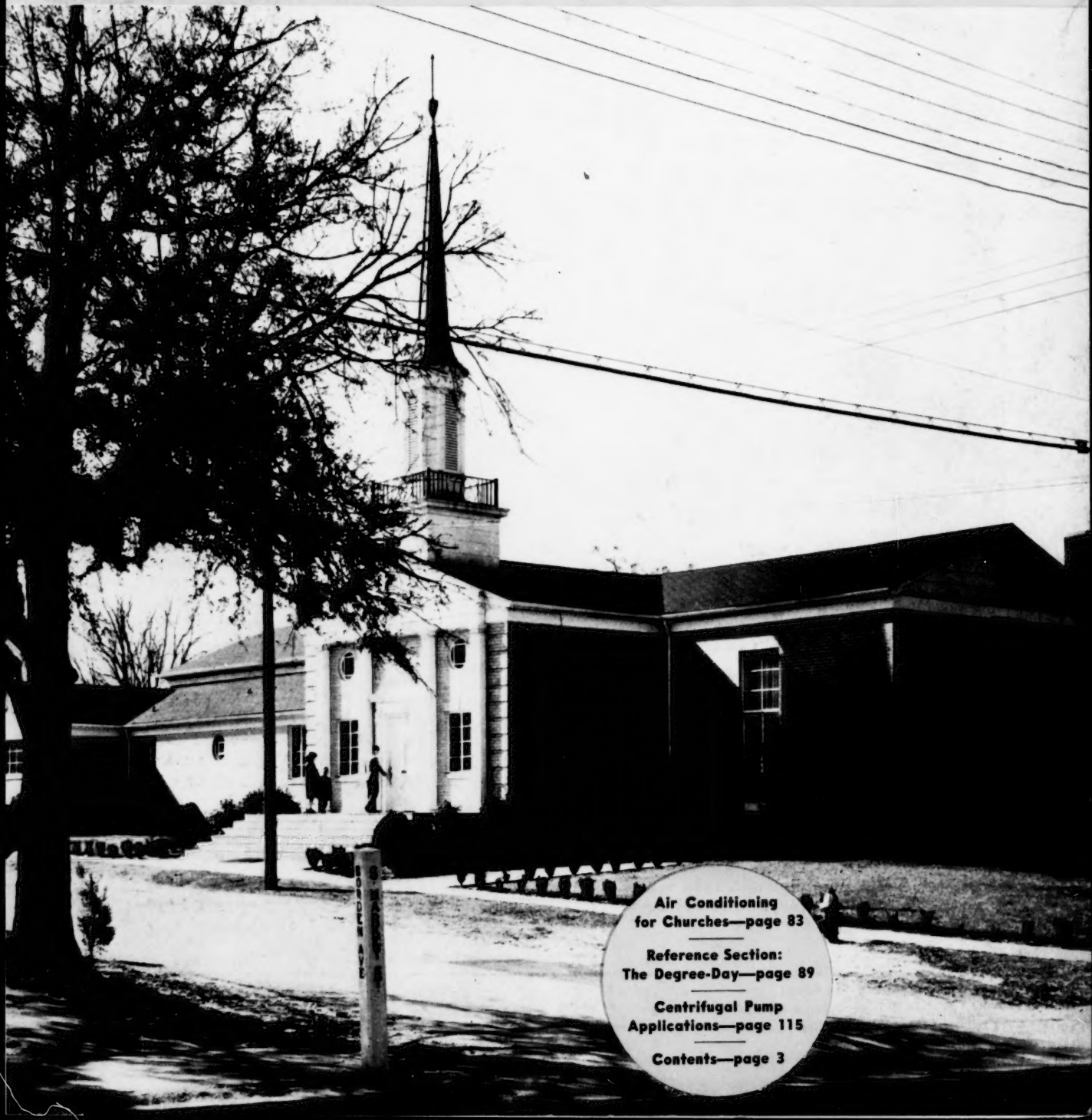
AIR CONDITIONING HEATING AND VENTILATING

MARCH, 1956 – 53rd YEAR



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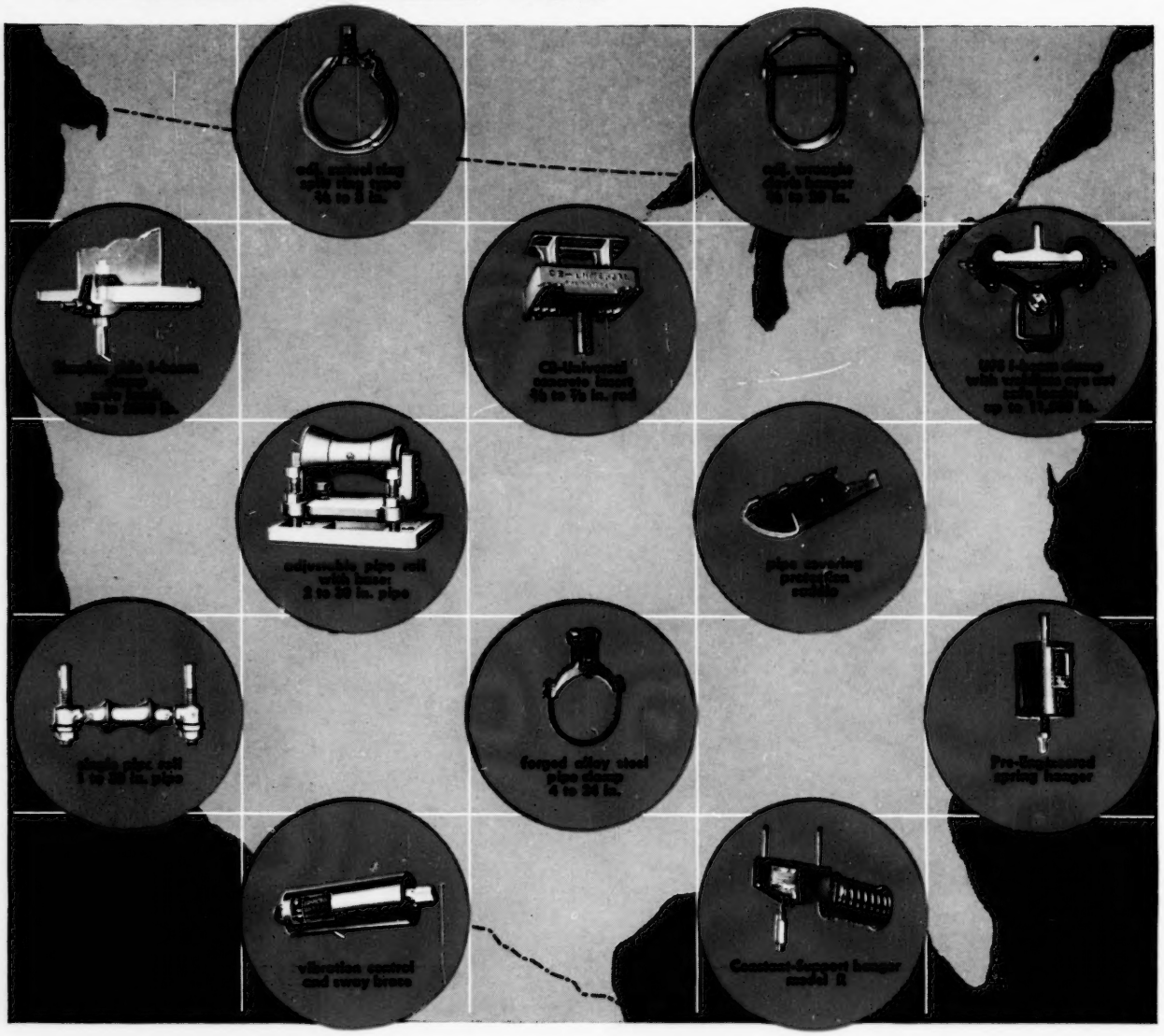

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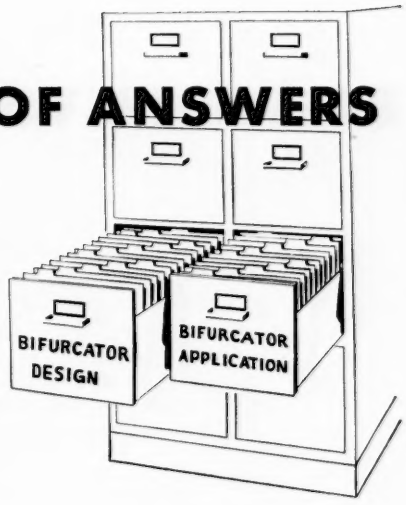

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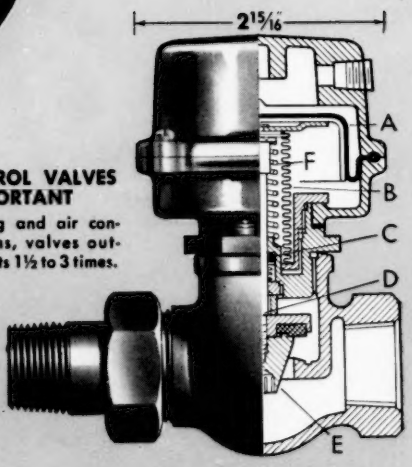

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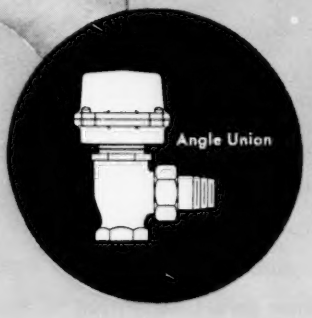

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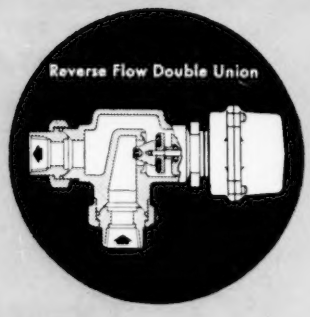

No Packing Maintenance. No Leakage of Water or Steam. No Loss of Vacuum.

To insure getting a temperature control system with the best control valves made for convectors, unit air conditioners, unit ventilators, radiators, panel heating and cooling coils — specify or install POWERS control.

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AIR CONDITIONING HEATING AND VENTILATING

MARCH, 1956

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The Cover: Church of Latter Day Saints in Wilmington, N. C., is completely air conditioned. For design data covering church air conditioning sysetms, see page 83.

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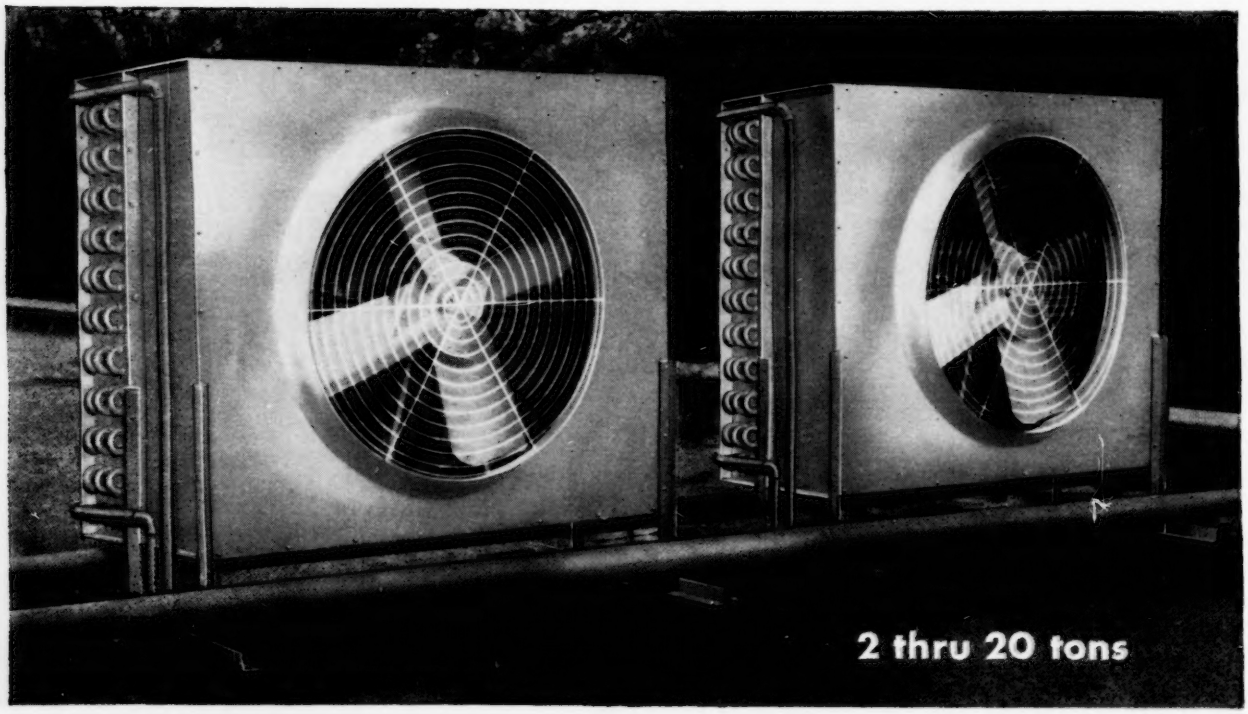
"LET'S GIVE THIS INDUSTRY A BETTER AIR-COOLED CONDENSER"



Now we proudly call to your attention the Halstead & Mitchell Air-Cooled Condenser for waterless air conditioning and refrigeration. This is today's *better* remote Air-Cooled Condenser.

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3. Extra-Quiet Operation—which is the direct result of deep-pitch fan blades driven at slow speeds.

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Even more important, you know these Air-Cooled Condensers bring you—with their Halstead & Mitchell nameplate—an assurance of the highest quality in the industry. Whether you are jobber, contractor, architect or manufacturer (and we'll be pleased to give quantity quotations), order Halstead & Mitchell "Co-ordinated Design" for *the better Air-Cooled Condenser.*

WRITE FOR BULLETIN AC-100

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Manufacturer of THE INDUSTRY'S WIDEST SELECTION OF COOLING TOWERS

World's Largest Manufacturer of WATER-COOLED, CLEANABLE CONDENSERS

HIGH SPOTS

• The **automatic control business,** accounting for $600 million a year, may be multiplied at least four times within the next ten years according to William A. Ray, president of General Controls Co., Los Angeles. Mr. Ray was commenting on the **growth rate** of a currently $3 billion a year industry in electronic instruments and automation equipment. General Controls' gross sales for 1931 amounted to $2.017; this year probably more than $27 million.

• An estimated $1.6 billion will be spent on **new chemical construction** through 1957 according to a survey by Manufacturing Chemists' Association, Inc., which showed that privately financed chemical construction completed during 1955 totaled $772 million in 269 projects. An additional 246 projects now under construction will cost an estimated $1.1 billion. This is an estimated $200 million worth of **piping business.**

• A pressurized **water reactor, privately financed** and maintained, capable of delivering 134,000 kw will be developed by Yankee Atomic Electric Co., according to a revised proposal recently approved by the Atomic Energy Commission. This is one of a series of proposals growing out of the AEC power demonstration reactor program.

• Atomic Energy Commission rules of practice applying to **licensing** become effective March 5, 1956. The effective rules are essentially unchanged from those published in August, 1955.

• Heavy construction contracts awarded in 1956 through mid-February were 42% above the corresponding period last year.

• **Air pollution spotters** in New York will use a **2-way radio** communication system between roof top observers and enforcement automobiles in a new program launched by Dr. Leonard Greenburg, Commissioner of Air Pollution Control.

• The Babcock & Wilcox Company has been granted the first permit to construct a critical experimental facility for the conduct of **nuclear reactor** core tests. The facility will be near Lynchburg, Va., on the site of the fuel element fabrication plant now being built.

• New York City's $220 million post-war **hospital construction** program will be finished this year, according to Public Works Commissioner Frederick H. Zurmuhlen. About $58 million worth of hospital construction will be wound up in New York in 1956, concluding the largest hospital program in this city's history.

• Contract awards for construction of **single family homes** in the 37 eastern states have almost exactly doubled in the past four years, according to reports of the F. W. Dodge Corp.

• An increase in shipments of 37.9% for **baseboard** type radiators led other products of the hot water and steam heating industry during the first three-quarters of 1955 compared to the same period in 1954, according to IBR. The industry's other major products showed increases of 21.7% for cast iron boilers and 30.1% for industrial finned tube radiation over the same period.

WASHINGTON OVERTONES

by LORING OVERMAN

Investigations, vetos, resignations and politics were among the causes of Washington Overtones during February. For some, it will be many a day before the repercussions die down.

• Take, for example, the ruckus over the **Natural Gas Act.** Despite last-minute revelations of lobbying pressures, Senate approved House-passed bill to exempt natural gas producers and gatherers from utility-type regulations.

Presidential veto, White House explained, was due to appearances of lobbying irregularities; **not to lack of sympathy** with purposes of the legislation. Those purposes, proponents explained, were to preserve, if possible, a little more of free enterprise and to leave with the states the power to regulate their own natural resources.

Overtones likely: Open season for Congressional **investigation of lobbying** . . . also probably a long wait before similar legislation can again reach White House.

• **Resignation** of Trevor Gardner, Assistant Air Secretary for Research and Development, touched off deafening overtones hinting penny-wisdom in some fields of defense.

As early as last August, Gardner urged an additional $200 million for research and development of **intercontinental ballistic missiles.** His resignation, he explained, was due to "an honest difference of opinion about the importance and scope of Air Force research and development and guided missiles programs."

Overtone: On the Senate Floor Senator Stuart Symington, citing the Gardner resignation, urged a **speedup effort** "to overcome the current Communist lead in the long-range ballistic missile field." Washington State's Senator Henry M. Jackson was another who insisted on a crash program "to catch up with the Russian lead."

• **Politics** is taking an important hand in deliberations on proposals to modernize the nation's **highway system.** Proposed in general is a $35 billion program to modernize 40,000 miles of interstate and connecting highways over a period of years.

Need for such a program is recognized. Also, there's little objection to federal government picking up 90% of the tab, instead of 50-50 split with participating states as at present.

Influencing **overtone** is fact that the project involves **largest peacetime fund proposal in history.** Hence, political sharpshooting from many angles. Probable outcome . . . temporary extension of present share-cost-with-states highway legislation, possibly with increased federal appropriation.

• Two words in foregoing sentence, "temporary extension," prompt the observation that there's nothing so permanent as a temporary tax. Hence, for the third time, a "temporary" wartime tax rate of **52% for corporations,** is about to be extended **beyond April 1.** That was the date set for return of the rate to the pre-war 47%.

Observers see little hope for the reduction, or for certain "wartime" excise taxes to expire on schedule.

• Another Washington overtone of importance politically is the tremendous **power of farm blocs.** After a voice vote in the House had exempted farmers from payment of taxes on petroleum products used for off-highway purposes, congressmen called for a roll call. Everybody wanted "to get in on the act." Result, vote of 387 to 0 in favor of the farmer exemption.

Observed one cynic: "If your proposition depends on logic alone, better forget it in an election year."

From now until November, or until adjournment, expect Congressional action weighted by vote-influencing potentials.

• Regardless of political overtones, the months ahead look sunny for makers of air-conditioning, heating and ventilating equipment. **Sales of heating and cooling equipment** topped the billion dollar mark in 1955. An increase of $38 million is predicted for 1956—with biggest gains in industrial, commercial and institutional equipment.

Shipments of **room air conditioners** increased nearly 400% from 1951 through

(*Continued on page 8*)

An Important Scientific Contribution
by the National Bureau of Standards
A Law of Appreciating Returns

The Law of Diminishing Returns in Heat Resistance, which affects so many building materials, has been found to be offset by a Law of Appreciating Returns which applies to parallel, reflective spaces.

The *importance* of this LAW will be felt in terms of winter and summer comfort in every kind of building, in fuel conservation, air-conditioning, cold storage. The practical and simple application of this LAW, *at very low cost*, will be about 8¢ per sq. ft. area of top floor ceilings and outer walls.

The findings of H. E. Robinson and F. J. Powlitch, under the direction of R. S. Dill, all with the National Bureau of Standards, were recently published by the Housing and Home Finance Agency in a booklet entitled "The Thermal Insulating Value of Air Spaces, Housing Research Paper 32."

Their findings show that for heat flowing *up* and *laterally*, successive reflective parallel air spaces, follow a law of appreciating returns.

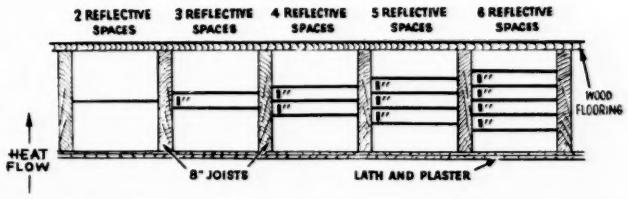
THE EXPLANATION OF THE LAW

If the *temperature difference* between bounding surfaces in an air space is decreased, there follows a significant decrease in convection, which is particularly important in up and lateral heat flow.

Such decrease can be attained, for instance, by dividing 8" ceiling joist spaces with aluminum sheets so they form successive reflective air spaces.

Here's a simple experiment! Assume the depth of one 8" joist space is divided in half by an aluminum sheet; another such space divided in 3 parts by 2 such sheets centered 1" apart; the next space divided in 4 parts with 3 sheets; the next in 5 parts with 4 sheets; another in 6 parts with 5 sheets.

Assuming the original 8" space has a *temperature difference of any fixed amount*, the more the space is divided, the greater is the *division of the original spread of temperature;* so EACH SPACE CARRIES A SMALLER BURDEN OF TEMPERATURE DIFFERENCE. There follows a *decrease* in convection and a corresponding significant increase in the insulating value of the spaces. This holds true down to space depths of about 1", below which the diminution in insulating value due to increase in conduction because of lessening the depth, becomes the controlling factor.



It was found that *each* 1" reflective space where the joist-space was divided in 6 parts, had greater insulating value than each 1" space where the joist-space was divided in 5 parts; which in turn had greater value than each 1" space where there were 4 subdivisions, etc. The total insulating value in an 8" joist space of 6 such reflective spaces was *more than twice* that of 3 such spaces, more than 50% better than 4 such spaces.

The Thermal Factors below were calculated by Infra engineers, with the use of Research Paper 32. The ceiling joist space was taken as 7⅝" deep; wall stud space 3⅝"; floor joist space 9⅝". For 5 and 6 space side heat flow, 5⅝" stud space was used. The roof was taken as asphalt shingles or roll roofing on 25/32" solid wood sheathing. Air temperatures were assumed as follows:

	Heat Flow	Inside Temp. °F	Outside Temp. °F	Mean Temp. °F	Temp. Diff. °F
Walls	side	70	0	35	70
Ceilings	up	80	10 (attic)	45	70
Ceilings	down	90	120 (attic)	105	30
Floors	down	65	30	48	35

THERMAL FACTORS FOR PARALLEL REFLECTIVE AIR SPACES
(In Btu per sq. ft., per hour, per degree F)

Where Dividing Media are ALUMINUM with .03 emissivity, and PAPER, spaced 1" apart.

Calculated on the basis of work done by the
NATIONAL BUREAU OF STANDARDS
For Housing & Home Finance Agency's Research Paper No. 32

Number of REFLECTIVE SPACES	UP-HEAT C FACTOR	UP-HEAT U FACTOR Attic Floor (roof excluded)	UP-HEAT U FACTOR Ceiling & Roof (unfloored attic)	DOWN-HEAT C FACTOR	DOWN-HEAT U FACTOR Attic Floor (roof excluded)	DOWN-HEAT U FACTOR Ceiling & Roof (unfloored attic)	DOWN-HEAT U FACTOR Floor over Crawl Space	SIDE-HEAT C FACTOR Wall	SIDE-HEAT C FACTOR Wall
4 REFLECTIVE SPACES 2 aluminum sheets 1 paper sheet . . . . ⅞" apart	.106	.084	.082	.035	.032	.032	.039	.069	.057
5 REFLECTIVE SPACES 3 aluminum sheets 1 paper sheet . . . . 1" apart	.082	.068	.066	.031	.029	.028	.033	.051	.044
6 REFLECTIVE SPACES 3 aluminum sheets 2 paper sheets . . . . 1" apart	.067	.058	.056	.029	.027	.027	.028	.043	.038

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ADV.

WASHINGTON OVERTONES (*Continued from page 6*)

1953. Central installations for commercial buildings are expected to climb from $600 million in 1953 to $2 billion in 1959.

• Question mark continues in one field involving heating, cooling and plumbing equipment of better types. Proposals for **federal aid to school construction** are still embroiled in the hassle over integration. Outlook: probably no school construction authorization at this session of Congress.

• Economists who were predicting favorably for only the first half of 1956—then a plateau or taper-off—are now second-guessing that the entire year will be **on the upward curve.** Faltering in housing and autos seems not to have affected entire economy—industrial and commercial building and equipping having taken up slack.

A 400 billion dollar economy rate during first half of '56; rising 2 or 3 billions further during last half of the year, is now the prediction.

• **Cabinet rank for the housing industry** is fostered in legislation proposed by Senator Herbert H. Lehman (D—N.Y.) and seven other senators. The measure proposes a Department of Housing and Urban Affairs, headed by a Secretary; a member of the President's Cabinet. Incorporated in the new agency would be "all functions, personnel, records, assets and obligations of the HHFA, Federal Housing Administration, Federal Home Loan Bank Board, Community Facilities Administration, Urban Renewal Administration and a new National Mortgage Corporation."

The Federal National Mortgage Association (Fannie May) would also be administered by the new department. The bill also proposes that the government:

• Build 200,000 public housing units for low-income families annually for a three-year period.

• Design, construct and set aside for elderly couples and elderly single persons 10% of the public housing units.

• Set up a National Mortgage Corporation with lending authority of one billion dollars to stimulate the construction of middle-income housing.

• Establish coordinating offices in major cities to help carry out the program, with authority to make grants to assist local agencies in planning and research.

• Operation Home Improvement, launched last month with a fanfare of publicity, is already being impeded. So says Senator Sparkman (D—Ala.) chairman of the Senate Banking Committee Subcommittee on Housing. The program seeks to **encourage repair and modernization** of existing home.

The Senator urged a revision of FHA Title I regulations to recognize basic changes in design and manufacture of such home equipment as stoves and refrigerators. He pointed out that FHA will insure a loan to purchase a dishwasher on the theory that it is part of the realty, but still refuses to insure stoves or refrigerators. This he said, is making "fish" of the dishwasher; "fowl" of a refrigerator or range.

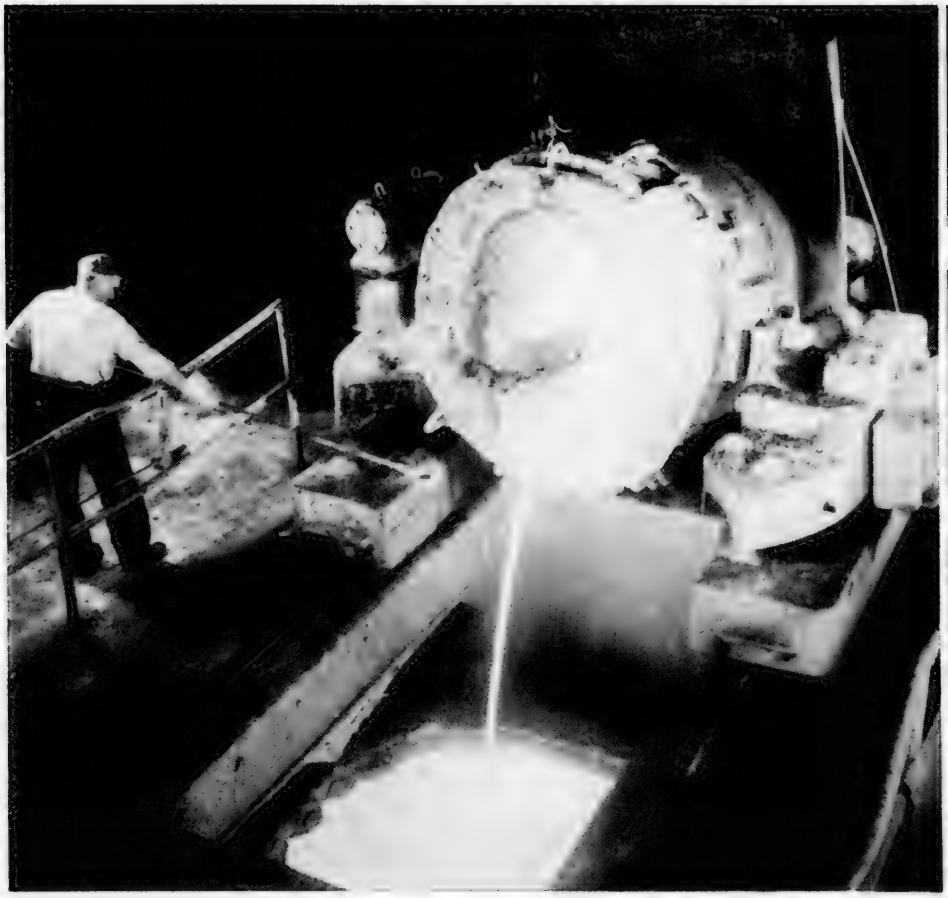
• **Housing starts** haven't dropped off as much as anticipated. January's 74,000 starts equalled that of December 1955, but were 15% below January of that year. The month's total was at annual rate of 1,183,000 units—no small number. Greater availability of **mortgage money** on favorable terms is responsible for predictions of building upturn come Spring.

• **Expanding industrial production** is the really big news behind the forecast for a good 1956, District of Columbia observers believe. Manufacturing industries as a whole expect to **spend 30% more** this year than last on new plants and equipment. Some branches of industry—airplanes, electronics, nuclear activities—will be up 60 to 70% over '55.

• Guess what constitutes the latest obstacle to rapid acceptance of nuclear fuels for electric power plants!

It's **how to arrange insurance coverage** to protect the power company against "extraordinary third party liability from a major nuclear catastrophe."

Viewpoints were expressed at a hearing before the Joint Atomic Energy Committee. Industry witnesses from Commonwealth Edison, Power Reactor Development Co., and Yankee Atomic Electric Company, all told committee members that nuclear power projects depend upon **quick solution of insurance problems.** Result, seminar on atomic insurance problems to be held during March, with solution by the end of 1957 set as a must deadline.



Melting pig iron in the cupolas

Purifying iron in bessemer

An exact iron silicate is tapped

"Sponge ball" goes to the press

This exclusive 5-minute operation gives WROUGHT IRON built-in protection against corrosion

The pig iron has been melted in the cupolas . . . purified by the bessemer converter. An exact iron silicate has been readied in special rotary furnaces and moved by ladle beneath the machine holding the highly refined, molten iron . . . everything is ready for the key step.

The signal is given. The processing machine tips its ladle forward. Molten refined iron flows at a controlled, predetermined rate into the ladle holding the melted silicate. This operation is shown above. The falling iron stream penetrates into the silicate, then separates into droplets. Liberated gas from within bursts apart the solidifying droplets. The shattered fragments settle continuously to form a "spongy mass"—welding hot—in the molten silicate.

This "sponge," weighing three tons or more, is pressed into a rectangular block called a "bloom." Giant rolling mills give final form to the useful material—WROUGHT IRON.

Because the thousands of fibers of silicate gathered in the mixing operation and distributed through the body of high-purity iron are unaffected by corrosion, they establish a "defense in depth" against corrosive attack. This is why wrought iron stays on the job longer, at lower cost per year.

Our booklet, *The ABC's of Wrought Iron*, tells more of this story. Send for your copy.

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WROUGHT IRON

TUBULAR AND HOT ROLLED PRODUCTS

ELECTRIC FURNACE QUALITY STEEL PRODUCTS

BRIEFLY STATED

• American Air Filter Co., Inc., has announced the appointment of Robert J. Wright as staff engineer for the Dust Control Department. Wright was formerly resident engineer for the W. W. Sly Mfg. Co., Cleveland.

• George K. Marshall has been appointed manager-product planning of the General Electric Company's Weathertron Department. Mr. Marshall graduated from the United States Naval Academy in 1933, when he joined General Electric. He joined the G-E Weathertron Department, when it was organized in January, 1952, as manager-commercial engineering.

• R. K. Grobholz has been appointed manager of the Worthington Corporation power pump sales division with headquarters at the corporation's Oil City, Pa., works. Mr. Grobholz succeeds A. F. Welsh who has been appointed manager of the marketing research division. Mr. Grobholz joined Worthington in 1943 as a test engineer in the Harrison works research and development laboratories.

• Westinghouse Electric Corp. has announced the election of John W. Craig as vice president of the company and general manager of its Electric Appliance Divisions. Mr. Craig succeeds John H. Ashbaugh, who remains as a Westinghouse vice president and special consultant to Chris J. Witting, recently appointed vice president of the Westinghouse Consumer Products Group.

• Raymond G. Mozley has been named chief applications engineer and Charles A. Lessing, formerly of International Harvester Co., has been appointed chief laboratory engineer of Copeland Refrigeration Corp. Mr. Mozley has been in charge of laboratory and applications development activities since joining Copeland in January, 1952.

• A completely new group of executives has been installed by Delta Heating Corp. of Trenton, N. J., manufacturers of domestic and industrial oil heating equipment. Among the new executives are Norman M. Emslie, chief design engineer, who has held responsible positions as engineer in charge of construction with the electronic computer project of the Institute of Advanced Study in Princeton; cyclotron designer at the Palmer Laboratory of Princeton University; and radar equipment designer for the Columbia Radiation Laboratory of Columbia University. William T. Goldsmith, newly appointed marketing manager and product research director, came to Delta from the General Electric Co. Delta's new office manager, Thomas A. Temple, was formerly vice president in charge of the Philadelphia Metal Drying Form Co.

• F. S. Cornell has been elected executive vice president and a director of the A. O. Smith Corp. He formerly held the title of the vice president and general manager of the corporation, multi-product manufacturer of steel and glass-lined steel goods. Mr. Cornell, who has been with A. O. Smith since 1945, succeeded Anthony von Wening on the board of directors. Mr. von Wening is chairman of the board of the Froedtert Corp. in Milwaukee.

• Herbert E. Barth has been named to the newly created position of executive vice president of American Blower Corp. At the same time, Edwin W. Petersen was appointed vice president, sales, of the corporation, succeeding Mr. Barth. Mr. Petersen formerly was sales manager of American Blower. Mr. Barth joined American Blower as an engineer in 1915 following his graduation from the University of Kentucky. Mr. Petersen joined American Blower as a sales engineer in 1923 following his graduation from Iowa State.

• Howard N. Eggleston, manager of construction for the Atlanta district office of Carrier Corp., has been appointed national construction manager. Mr. Eggleston began his new assignment at the corporation's Syracuse, N. Y., headquarters the first of the year. He has worked in the Atlanta district most of the 10 years he has been with the organization.

• The University of Missouri is sponsoring its third annual air conditioning conference on March 22 and 23, 1956. The conference is for dealers, architects, contractors, engineers, and service men and will feature speakers from the air conditioning industry and from the University.

• Worthington Corporation has announced the election of Elston J. Tribble and Aloysius M. Tullo as vice-presidents. Mr. Tribble, former assistant vice president of manufacturing, will have general supervision of a group of operating divisions which were recently organized under the corporation's decentralization program. Mr. Tullo will continue as general manager of the company's largest division at Harrison, N. J.

• Patrick N. Morgan has been appointed manager, heating and air conditioning sales of Home Equipment Div., Combustion Engineering, Inc., Chattanooga, Tenn. Mr. Morgan was previously the sales representative in the Ohio-Michigan territory. Prior to joining the company, he was an engineer with the Tennessee Valley Authority and the Georgia Power Company.

• Cleveland Fuel Equipment Co., Cleveland, Ohio, announces the addition of O. A. Reiter as advertising and sales promotion manager. Mr. Reiter headed his own advertising agency of Reiter and Associates, servicing accounts in the electrical, plumbing, heating, petroleum, chemical, aircraft and automotive fields.

• L. H. Kramer has been named general manager of Union Asbestos & Rubber Co.'s Heating and Cooling Div. Prior to joining Unarco, Mr. Kramer was executive vice president and general manager of American Well Works, Aurora, Ill., manufacturers of water treatment equipment and water, sewage and industrial waste pumps.

• Edward G. Jepson has been named advertising manager of C. A. Dunham Co., Chicago, Ill. He succeeds J. W. O'Neill who has taken a position in Louisville. Mr. Jepson was formerly the assistant merchandising director of Specialty Salesmen Magazine, Chicago, and has been in the Advertising and Sales Promotion Section of E. I. Du Pont de Nemours and Co., Inc., Wilmington, Dela.

And in San Francisco — A FUTURE OF FAULTLESS SERVICE

EQUITABLE LIFE ASSURANCE SOCIETY BUILDING
San Francisco, California
LOUBET & GLYNN, successors to W. D. PEUGH
architects
IRWIN CLAVAN
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H. W. EAGLESON
mechanical engineer
SCOTT-NELSON CO.
mechanical contractor
HEIECK & MORAN
wholesale distributor
KOHLER CO.
plumbing fixtures manufacturer

Stronger skyscrapers for San Francisco became mandatory under the 1948 building code with its strict earthquake provisions. The 25 story Equitable Building — a towering COYNE & DELANY installation — meets requirements with a unique and complex structural framing, the strongest ever assembled. Notable as the first skyscraper erected in San Francisco since the early 1930's, this $9,000,000 landmark is also the first to be fully air conditioned. Beneath the stainless steel, aluminum, and white marble exterior, COYNE & DELANY flush valves of the superior diaphragm type were selected for use. Here and in other fine buildings, where standards are rigid, look for DELANY — "the fastest growing name in flush valves!"

This new "HAND BOOK and CATALOG No. 53" is the most comprehensive of its kind—designed for everyday reference . . . 19 pages of installation details for exposed, concealed and special FLUSH VALVE installations . . . over 75 blue prints . . . cut away views . . . many pages of charts, formulae, piping details . . . sent free, if requested on firm letterhead.

COYNE & DELANY CO. • 834 KENT AVE. • BROOKLYN, NEW YORK
IN CANADA: THE JAMES ROBERTSON CO., LTD.

DELANY *Flush* VALVES Since 1879

BRIEFLY STATED

(*Continued from page* 10)

• Opening a new $350,000 Fan and Blower Division plant marked the first step in a half-million dollar expansion program by The Peerless Electric Co., Warren, Ohio. President Ralph Kroehle predicted his firm will soon be producing about 400 different types and sizes of fans and blowers, compared to approximately 250 models in the present line. He said the new plant increases manufacturing space by 50% and provides more room for increased production efficiency. The half-million dollar expansion is the continuation of an increase in capacity that began in 1946 when a $200,000 addition was built onto the original plant. The company added modern shipping facilities in 1947 and enlarged factory offices two years later.

• Formation of a firm of consultants in research and engineering for industry and government agencies under the name Resources Research, Inc., was announced by Dr. Louis C. McCabe, formerly scientist director in the United States Public Health Service. The company with offices in Washington, D. C., New York City, and Casper, Wyo., will handle research and development in geology, mining, industrial wastes, water resources, and the economics and supply of conventional and atomic fuels. It will deal with such problems as fuel sources and their evaluation for power, metallurgy and chemistry; research and engineering in air and stream pollution; water treatment and supply problems; and the development of fuel resource properties. Dr. McCabe will be joined in the enterprise by Frederick S. Mallette, executive secretary of the Committee on Air Pollution Controls and research manager of the American Society of Mechanical Engineers, and William S. McCabe, consulting geologist.

• A seminar primarily for engineers responsible for the operations of electrostatic precipitation equipment will be held at The Pennsylvania State University, June 11-15. R. E. Armington, assistant professor of electrical engineering at Penn State, is seminar chairman. The week-long meetings will be sponsored by the University's College of Engineering and Architecture and General Extension services.

• Herman W. Nelson, 79, a pioneer in the heating and ventilating business, died January 11 in his home in Moline, Ill., after a long illness. The industrialist was the founder of the company which bore his name until it merged with the American Air Filter Co., Inc., in 1950. In 1906 he founded the Moline Vacuum Heating Co. which later became known as the Herman Nelson Corp. He was a life member of ASHAE. He is survived by his widow, Agnes, two sons, Richard and Robert, both of whom are vice presidents of American Air Filter Co., and a daughter, Mrs. Harry Sosnoski of Washington, D. C.

• A. D. Walker & Co., Inc., heating, ventilating and air conditioning contractors under the direction of Vincent Arnold, William H. Browning II, and A. David Walker, Jr., announces the opening of new offices at 270 Park Avenue, New York 17, N. Y.

• Fred S. Hudson has been named general manager of sales for the heating and air conditioning division of National-U. S. Radiator Corp., Johnstown, Pa. Mr. Hudson joined the former National Radiator Company in 1936. He served as a sales engineer at the company's branch sales office in Richmond, Va., until 1942. When National Radiator merged with U. S. Radiator in 1955, Mr. Hudson became a district manager for the new concern, National-U. S. Radiator Corp. He has been in charge of marketing operations in the Pittsburgh, Cincinnati and Cleveland branch sales offices.

• W. M. Reed, 63, founder and chairman of the board of the American Air Filter Co., Inc., died at his winter home in Ft. Lauderdale, Fla., February 2. He was a victim of a heart attack. Two months ago, Mr. Reed moved from the presidency of AAF to the newly created post of chairman of the board and retired from active direction of the company. He was succeeded as president by W. G. Frank, then executive vice president. Mr. Reed began his career by operating the old Louisville Auto Painting & Trim Company. He was troubled with dust and dirt accumulating on the bodies of newly painted automobiles. It was then that he began experimenting with air filtering devices. The Reed Engineering Company was established and was a forerunner to the Reed Air Filter Company which was formed in 1922. It was the parent organization of today's American Air Filter Company.

• James M. Whalen, manager of convector sales for The Trane Co., has been elected president of the Convector Manufacturers' Association, Inc. for a one-year term.

• In larger metropolitan areas, Curtis Mfg. Co. is now appointing wholesale distributors to handle their packaged lines for residential and commercial applications. The balance of the line, including packaged liquid chillers and condensing units up to 100 tons with matching air handing units, cooling towers and evaporative condensers, will be handled by manufacturers representatives. This will make the complete Curtis line available to local contractors and at the same time, provide them with engineering assistance and service.

• Ralph Allen, who had been a market manager in Minneapolis-Honeywell Regulator Co.'s heating division, has been named administrative assistant to the company's general sales manager. He succeeds Clarence W. Spangle, who has been appointed general manager of Honeywell's subsidiary in Germany. Mr. Allen formerly was in charge of nationwide sales of Honeywell-built self-powered heating controls.

• Albert Kahn Associated Architects and Engineers of Detroit has appointed Sol King director of architecture for the firm. In this position, with full status as associate, Mr. King will exercise supervision of all phases of architectural development of all projects from their inception. Frederick A. Fairbrother, after 40 years of service with Albert Kahn, has retired from the firm where he rose from asistant chief draftsman to vice president and chief architect.

AEROFIN

Heat-Transfer Surface

Aerofin is sold only by manufacturers of nationally advertised fan system apparatus. List on request.

● High Efficiency

● Long Service Life

● Low Maintenance Costs

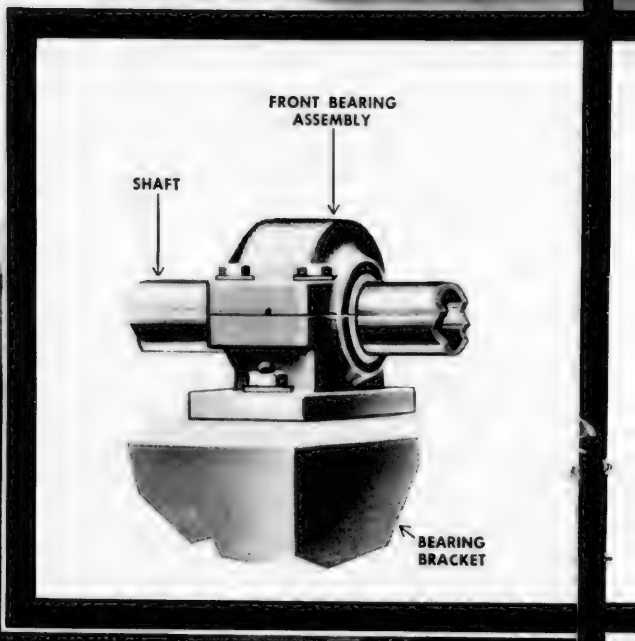
You are assured of high efficiency in heating or cooling — long service life — low maintenance and service costs, when you specify Aerofin extended-surface heat exchangers.

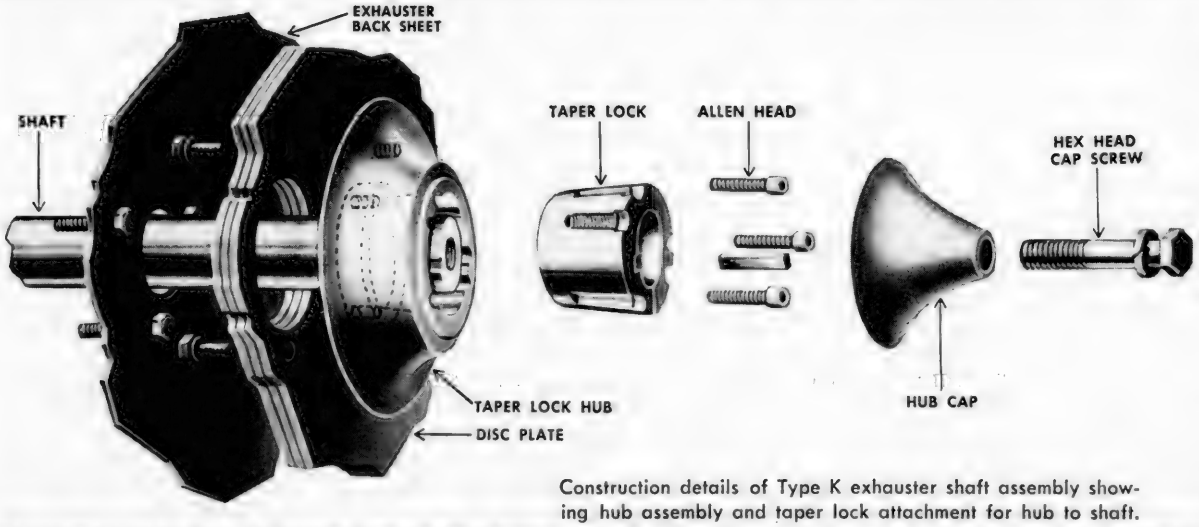
The reason is obvious: Aerofin makes heat exchangers *exclusively* — offers you the results of unequalled experience, unequalled production facilities, unequalled materials testing and design research — and the guidance of a complete, highly skilled engineering staff, at the plant and in the field.

For the most practical solution to your heat-exchange problem, ASK THE AEROFIN MAN.

AEROFIN CORPORATION
101 Greenway Ave.
SYRACUSE 3, N. Y.

AAF EXCLUSIVE!





Construction details of Type K exhauster shaft assembly showing hub assembly and taper lock attachment for hub to shaft.

Special Hub Assembly on Industrial Exhauster ...cuts maintenance and replacement costs

Highly efficient unit an outstanding success in thousands of exhaust system installations

Talk about money-saving features – the new AAF Type K Industrial Exhauster has them! For one thing, the exclusive Taper Lock Hub Assembly permits fast, easy changeover on heavy-duty applications where periodic wheel replacement is anticipated. Cuts maintenance time in changing wheels. Eliminates the problem of impellers freezing to shafts. A NEW shaft is seldom required!

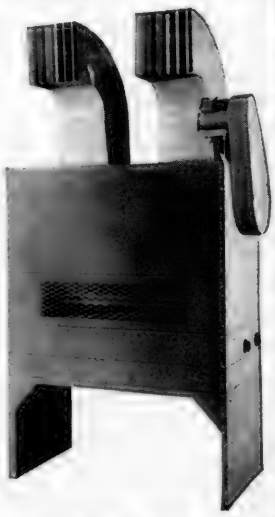
If you have an exhaust system problem of any kind, you can depend upon the AAF Type K Exhauster to provide high efficiency. Here is an exhauster that has already proved itself a heavy-duty workhorse in AAF Dust Control Systems faced with the severe requirements of high static pressures, heavy dust concentrations and frequently, highly corrosive conditions. In major industrial plants throughout the country, it has met with outstanding success!

OTHER DESIGN ADVANTAGES

NEW IMPELLER DESIGN	Another AAF Exclusive! Narrow wheel design assures smooth operation when handling heavy dust loads – even with material accumulation on the wheel!
HIGH EFFICIENCY	Maintained over a wide range of operations and variations in static pressures.
HEAVY DUTY SHAFT AND BEARINGS	Insure longer unit life. Narrow wheel design also increases effectiveness of shaft and bearings by reducing length of wheel overhang.
COMPLETELY ROTATABLE	In 45° increments of discharge positions in the field.
COMPLETELY REVERSIBLE	In the field, to allow either clockwise or counter-clockwise rotation.

Avoid air "Starvation" in your Plant with HERMAN NELSON Industrial Heaters for make-up air.

Replace exhausted air, balance minus pressures with Herman Nelson Industrial Heater make-up air units. They eliminate air "starvation" in various areas—such as sudden blasts when doors are opened . . . drafts and uneven temperatures that cause discomfort. Their big capacity does the job of many smaller, propeller-type units. Available in heat capacities ranging to one million BTU's.



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AAF herman nelson

American Air Filter COMPANY, INC.

GENERAL OFFICES: LOUISVILLE, KY. • PLANTS IN LOUISVILLE, MOLINE (ILL.), MORRISON (ILL.), CHICAGO AND MONTREAL (CANADA)

BETTER AIR IS OUR BUSINESS

Propeller Fan | Centrifugal Fan | Unit Blower | AAF Dust Control Equipment

Cleaner air with half the filters

—reports large metropolitan library

Keeping hundreds of thousands of library volumes as dirt- and must-free as possible calls for quantities of clean, fresh air.

At one large library, they tried many types of filters —were using banks of two 1″-thick throwaway filters in series—to clean intake air. But the surfaces quickly clogged with dirt—operating costs became excessive. Then they tried PLIOTRON—the world's first truly washable, electrostatic, panel-type air filter.

They soon found single banks of PLIOTRON, 1″ thick —*only half the number*—cleaned the air better, did not clog and were easily cleaned for repeated use. That's because the unique filter medium of PLIOTRON carries a permanent, electrostatic charge that actually attracts and captures up to five times as many fine dirt particles. It also permits depth-loading rather than surface-loading, and maintenance of full efficiency by simple washing.

PLIOTRON can bring cleaner air at lower cost and with less work to any forced-air heating or air-conditioning system using panel filters. For details see your PLIOTRON Distributor. Or write Goodyear, Pliotron Sales Dept. 722, Akron 16, Ohio.

PLIOTRON Air Cleaner by

GOODYEAR

Pliotron—T.M. The Goodyear Tire & Rubber Company, Akron, Ohio

THE GREATEST NAME IN RUBBER

We think you'll like "THE GREATEST STORY EVER TOLD"—every Sunday—ABC Radio Network—THE GOODYEAR TELEVISION PLAYHOUSE—every other Sunday—NBC TV Network

PROVEN QUALITY

50th Anniversary

LAUNER

SINCE 1906

DEPENDABLE

PROVEN QUALITY

50th Anniversary

BRUNNER

SINCE 1906

DEPENDABLE

1956 marks the end of Brunner's first fifty years . . . and the beginning of new sales opportunities for you!

With the addition of new and redesigned models, Brunner now offers the most complete line of open-type refrigeration and air conditioning condensing units . . from 1/4 through 100 H. P. . . available from a single manufacturing source.

Outstanding is the full line of new, moderate speed compressors in the over-10 H.P. class featuring pressure lubrication, new lightweight running gear, standardized valve plate assemblies, and a new Brunner exclusive . . . an automatic switch-over system that cuts in to protect

BRUNNER SINCE 1906 ENGINEERING FOR THE FUTURE

the compressor in case of pressure lubrication failure.

Brunner-Metic semi-hermetic condensing units are available from 1/4 through 3 H.P.

Redesigned BAC packaged air conditioners will include 3, 5, 7 1/2 and 10 H.P. models, featuring separate discharge plenum.

Brunner dependability has long been a "buy-word" in the refrigeration and air conditioning industry. And today it's better than ever!

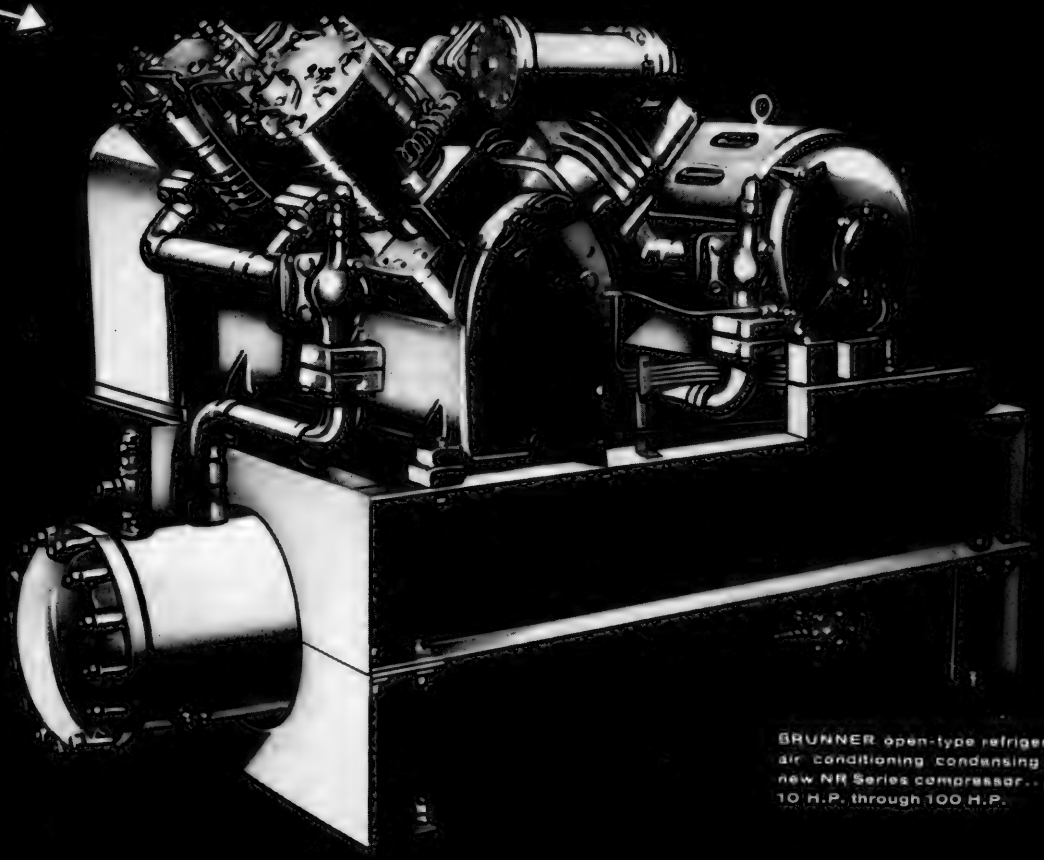
See your Brunner representative, or write for all the facts about the complete Brunner line.

BRUNNER MANUFACTURING CO., UTICA, N.Y.

The Brunner Company, Gainesville, Ga.

In Canada: Brunner Corp. (Canada) Ltd., Toronto, Ont.

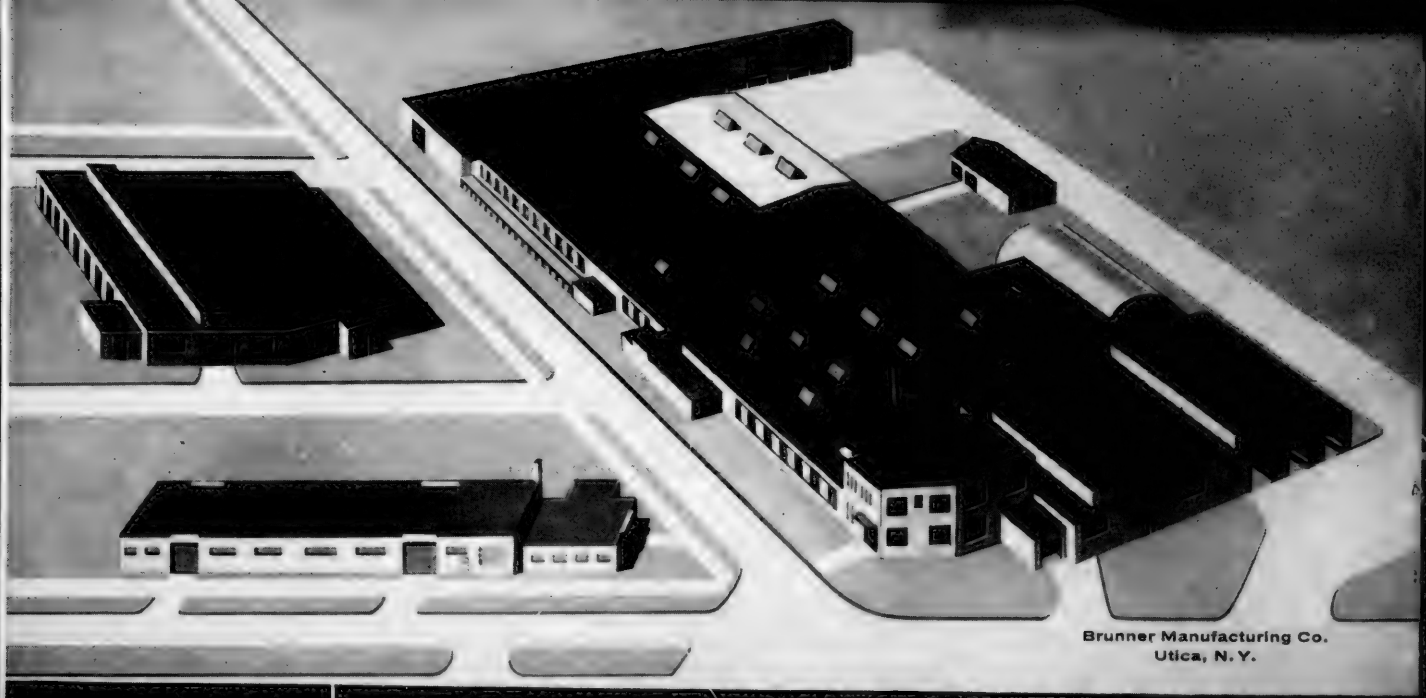
AND IF YOU NEED AIR COMPRESSORS—Brunner has a complete line, for every requirement, ranging from 1/4 H.P. through 50 H.P.



BRUNNER open-type refrigeration and air conditioning condensing unit with new NR Series compressor . . . available 10 H.P. through 100 H.P.

MEANS MORE SALES DOLLARS FOR YOU!

BRUNNER-METIC semi-hermetic refrigeration condensing unit . . . air-cooled or water-cooled . . . from ¼ H.P. through 3 H.P.



Brunner Manufacturing Co.
Utica, N.Y.

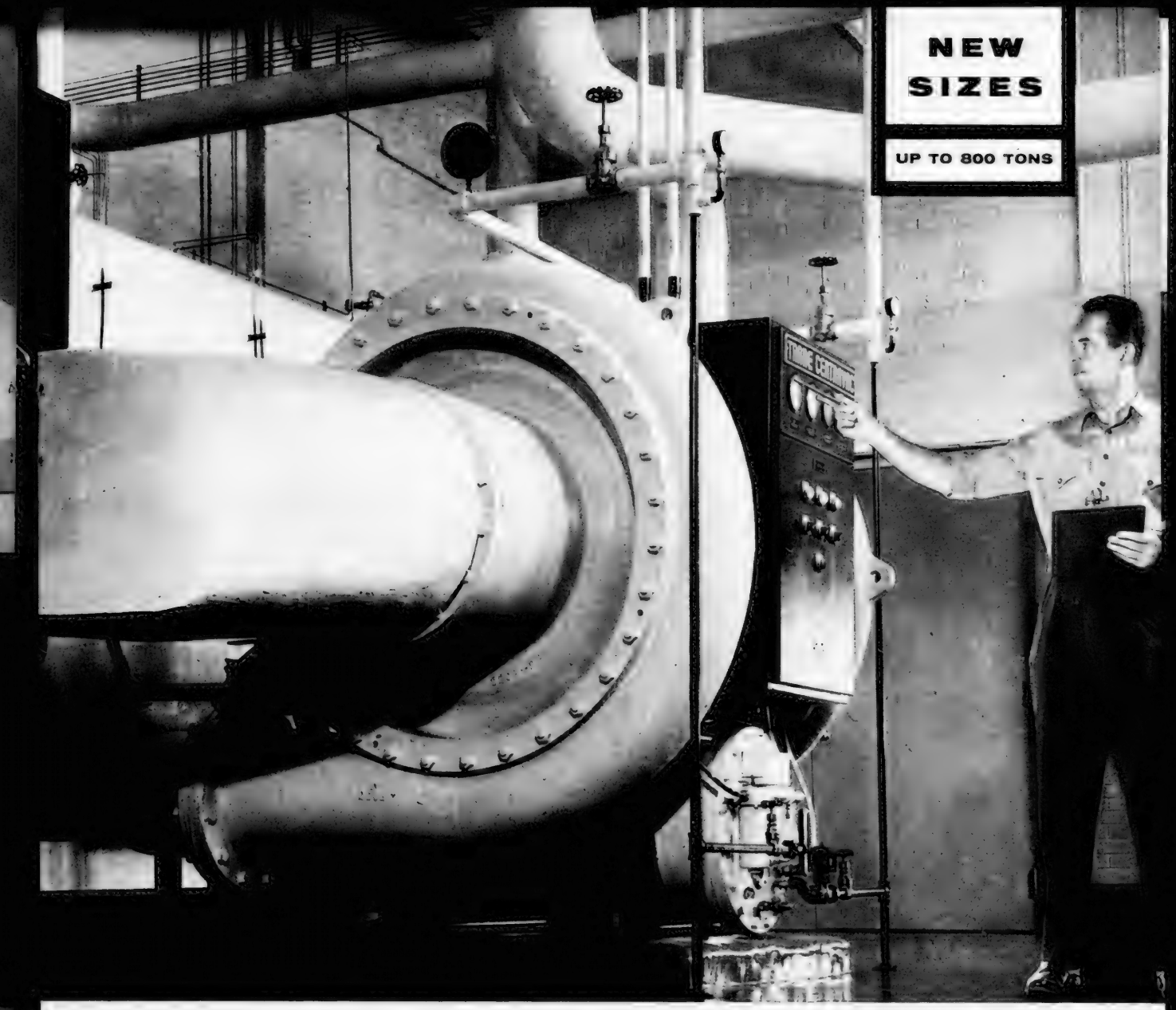
NEW PLANT FACILITIES

PLANNED RESEARCH

ADVANCED ENGINEERING

BRUNNER

The Brunner Company
Gainesville, Ga.



Trane CenTraVac, the water chiller you can place anywhere from basement to penthouse—even outdoors!

No matter where your water chilling equipment must be located, here's the way to simplify your problems in design, installation and operation.

You can install the TRANE CenTraVac more easily anywhere from basement to penthouse because it's so compact, quiet and vibration-free. And you can even install it outdoors!

Now, new larger sizes to 800 tons give you *all* advantages found in the TRANE CenTraVac, the industry's first hermetic centrifugal. Just check these convenient CenTraVac features:

Greater freedom of location. No disturbance from noise or vibration.

Flexibility for comfort or process.

Easy installation on any level surface strong enough to support its weight. No field alignment.

Automatic. Automatically adjusts its use of power almost directly to cooling load down to 10% of capacity. No full-time attendant.

Hermetic. No shaft seals, no gear box; only one major moving part.

All are yours in the CenTraVac!

For heating, cooling, ventilating . . .
For any air condition, turn to

TRANE

MANUFACTURING ENGINEERS

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EASTERN MFG. DIV., SCRANTON, PA.
TRANE COMPANY OF CANADA, LTD. TORONTO
90 U.S. AND 17 CANADIAN OFFICES

New Trane Air Conditioners take

Trane Accessible Hermetic Compressor

Motor and compressor are completely sealed, yet both are easy to service. Replaceable cylinder liner. Exclusive cadmium-plated valves last up to 800% longer than ordinary steel valves.

Self-Contained up to 27% less space

New beauty with trim new cabinets; new quietness with new "iso-sound" design

Here are "space-misers" for you: the new 3, 5 and 7½ h.p. TRANE Self-Contained Air Conditioners for 1956. They're completely redesigned to pack top efficiency into new, trimmer cabinets —and do their job without making a big noise about it!

New space-saving—as much as 27% on the 5 and 7½ h.p. models—has been achieved by new twin-fan construction.

New quietness has been attained with "iso-sound" design—fan section and compressor section each *floating independently* on sound and vibration isolators.

New beauty you can see, and your customers will agree!

And full-rated capacities are, as always, guaranteed by rigorous tests in the TRANE Research and Testing Laboratory, "The House of Weather Magic."

With the TRANE Accessible Hermetic Compressor as their heart, these are the complete-in-one-package air conditioners TRANE-engineered, TRANE-built, of components *matched* together to *work* together, to assure complete customer satisfaction. For details, see your TRANE Sales Office or write TRANE, La Crosse, Wis.

"Commercial" Sizes of 10, 15, 20 Tons, Too

Quick and easy to install, these models come with all internal wiring and piping completed. Multi-step capacity control reduces starting and stopping, saves power. Cadmium-coated compressor valves for longer life. Easy to service. Evaporative condensers optional for water savings up to 95%.

For heating, cooling, ventilating . . .
For <u>any</u> air condition, turn to

TRANE

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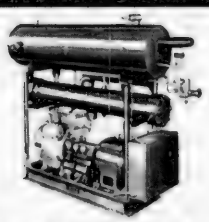
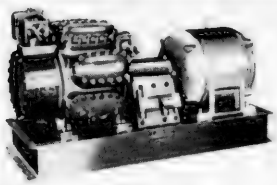
NEW SIZES



TRANE Cold Generators now in 8 new models, including 125 and 150 h.p. sizes. Simple piping and wiring connections make them easy to install.

NEW SIZES

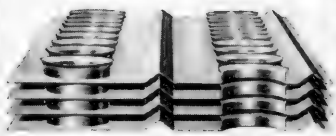
NEW SIZES



Reciprocating Compressors are smooth, direct-drive units. Capacities to 75 tons in single units . . . from 60 to 150 tons in Duplex units.

NEW DESIGN

NEW DESIGN



TRANE Coils have the exclusive Delta-Flo Fin for higher heat efficiency, increased strength, greater ease of cleaning. Mechanically bonded.

New UniTrane models for '56 Air Conditioner Line

provide the most versatile in Trane history!

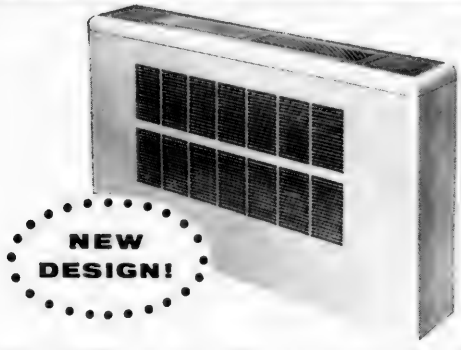
Now! Induction UniTrane units make the Trane line wider than ever!

The famous UniTrane individual room air conditioners for 1956 are slimmer, with new, trim, space-saving design. And they provide individual room control with maximum flexibility and economy of operation. Simple piping and wiring connections—yet they heat or cool, ventilate, dehumidify and filter *all* the air!

Best of all, there's a UniTrane model to fill the most exacting requirements for any multi-story, multi-room application—for new or existing buildings. There are attractive floor models that blend with modern building design; ceiling models for furred-in installations; concealed types for that "built-in" look. And now, for 1956, the line is made more versatile with the addition of the new Induction UniTrane unit with optional filters for installations where it is desired to filter *all* the air. Housed in an attractive cabinet so sturdy it supports a man's weight, this new unit is trim, compact and efficient.

So now, with these Induction units, the regular Fan-Coil UniTrane units, Climate Changers and other TRANE equipment, TRANE brings you *matched* equipment to do any air conditioning job—from small shop to giant skyscraper! In flexibility for design and installation, or for future remodeling, here is the utmost in air conditioning equipment . . . units designed and built together to work together!

Class III Fans now in a wider range of *standard* sizes bring you new freedom of design. Designed especially for high-pressure air conditioning systems.

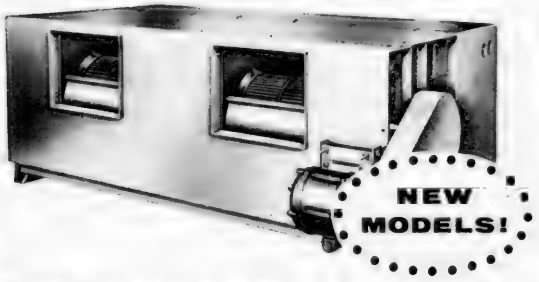


Induction UniTrane air conditioners may be ordered to filter *all* the air—not just the primary air. Individually controlled for personal climate preference or changing needs.

For heating, cooling, ventilating . . .
For any air condition, turn to

TRANE

MANUFACTURING ENGINEERS



TRANE Climate Changers meet a wide variety of air conditioning requirements. Multi-zone models provide different climates for up to 6 zones at the same time. Capacities: Regular models to 29,000 cfm; Multi-zone models to 23,400 cfm.

For skyscrapers, schools or corner stores, houses, apartments or industrial plants . . .

One source . . . your heating

Trane Convectors for quick, clean, comfortable heat

These famous TRANE Convectors will provide the answer for many difficult heating problems—in offices, residences, laboratories, stair wells and corridors. Easy to install, they are available in a wide variety of models for free-standing, recessed or wall-hung applications. Eleven cabinet styles with flat or sloping tops give you flexibility of design. And TRANE Convectors come pre-assembled for fast, easy installation.

The famous TRANE fin-and-tube extended surface coil serves as the heating element on all TRANE Convectors. Cabinets feature sturdy construction with rounded corners, overlapped cabinet joints, and integral Free-Flo Grilles.

TRANE Wall-Fin brings draft-free heating to long wall and window areas. Can be used singly or in tiers as a low cost means of space heating or supplemental heating at points of high heat loss. Sloping top cabinets or grilles.

TRANE Force-Flo Heaters provide a blanket of heat for doors and entryways in restaurants, shops, showrooms and public places. Compact units, ideal for hard to heat places.

TRANE Baseboard Convectors heat where the cold begins—along outer walls, under windows. 50% faster installation—because cabinet and coil are pre-assembled. Efficient heat transfer assured by TRANE Extended Surface Coil, adapted to baseboard use.

One responsibility for all and ventilating needs!

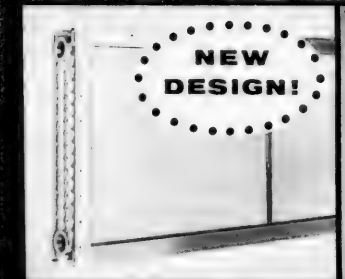
Trane Torridors for comfort or process heating and ventilating

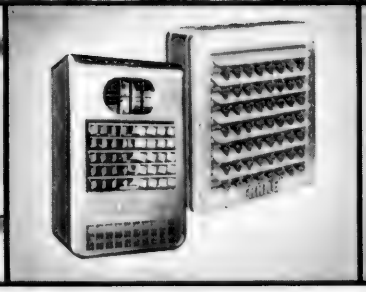
Here's a flexible, large capacity, heavy duty blower-type unit that may be used with or without ducts to deliver up to 1½ million Btu's. For space heating and ventilating, this TRANE Torridor with its powerful centrifugal fans distributes filtered, warmed air over large areas. And it can deliver air through ducts to smaller rooms, or hold accurate temperatures for process applications. Ideal for warehouses, shipping docks, garages—anywhere you need a reliable supply of tempered air for heating, ventilating. Many casing styles, damper arrangements to provide the features you need.

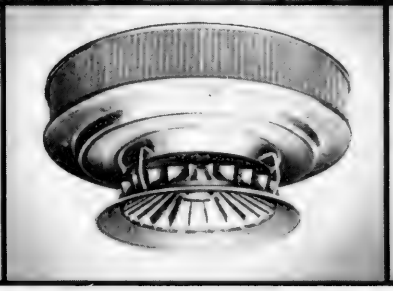
For heating, cooling, ventilating . . .
For <u>any</u> air condition, turn to

TRANE

MANUFACTURING ENGINEERS







TRANE Heating Coils provide instant heat response. Aluminum-copper construction with exclusive Delta-Flo Fin and mechanical bond.

Horizontal and Gas-Fired Unit Heaters put the heat where you want it. Only TRANE Heaters have the exclusive, patented Louver Fin Diffusers that direct air stream in any number of patterns.

Projection Unit Heaters are vertical discharge units with patented TRANE Louver Cone Diffusers. Can direct heat in different directions, different proportions at the same time!

TRANE Steam Specialties save fuel, stop waste, protect equipment. Complete line of valves, traps, strainers, vents for heating or process applications.

Trane Unit Ventilator with Kinetic Barrier Action stops drafts all day long!

This smoke test shows how the TRANE Unit Ventilator is helping solve the ventilating problem in modern schools . . . helping to maintain even temperatures and eliminate drafts—in every corner of the room.

The TRANE Unit Ventilator, with *Kinetic Barrier* action, forces air upward under *constant* pressure. Stops chilling downdrafts *all day long.* Rising not just at one point, but blanketing the entire wall, this tempered air blends with room air to keep the air in every part of the classroom fresh and comfortable.

Whisper-quiet in operation, the TRANE Unit Ventilators have decorator styling that adds to the beauty of any room. Baked-on finish is extremely resistant to scuffs, bumps and kicks . . . stays *new-looking* longer!

For heating, cooling, ventilating . . .
For any air condition, turn to

TRANE

MANUFACTURING ENGINEERS

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*"TUBE-TURN" and "tt" Reg. U.S. Pat. Off.

To help you in the fight on corrosion...

FIBRES of inert iron silicate distributed throughout high-purity iron make wrought iron *tough* and *corrosion-resistant*... hence a desirable piping material for many applications where corrosion is a factor. In this material too, the "TUBE-TURN"* line of welding fittings is *complete* . . . all types, sizes and schedules for every job in wrought iron piping.

Here is another reason it pays to specify this leading brand! You get exactly what you need from more than 4000 items in all piping materials . . . available *promptly* from your nearby Tube Turns' Distributor. He can save you purchasing time and delivery time, and give you more for the dollar with TUBE-TURN Welding Fittings and Flanges.

TUBE-TURN Welding Fittings and Flanges are made in U. S. A. They meet *all* U. S. piping code specifications.

The complete line... for all your needs

CARBON STEELS
STAINLESS STEEL
CHROME-MOLY STEELS

ALUMINUM
COPPER
BRASS
MONEL METAL
INCONEL
NICKEL

Available from your nearby TUBE TURNS' Distributor

TUBE TURNS

LOUISVILLE 1, KENTUCKY

A Division of National Cylinder Gas Company

DISTRICT OFFICES: New York • Philadelphia • Pittsburgh • Cleveland • Detroit • Chicago • Kansas City • Denver
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TUBE TURNS' *Engineering Service*

helps you apply wrought iron fittings on jobs like these...

Air Conditioning piping . . . wrought iron and TUBE-TURN® Welding Fittings are used for condenser water lines shown here, part of new air conditioning installation at State Capitol Building, Harrisburg, Pennsylvania. Contractors: Riggs Distler & Co., Inc.

Down Spouts on Abbey Avenue Bridge, Cleveland. Made of 10" wrought iron pipe, with 45° TUBE-TURN Wrought Iron Elbows. Contractor: Gorman-Lavelle Co., Cleveland.

Hospital piping . . . wrought iron 5" cold water, 2½" high-pressure condensate returns and 4" pump discharge . . . at City Hospital, Cleveland. TUBE-TURN Wrought Iron Fittings used throughout.

Radiant Heating. Many engineers prefer wrought iron piping for these systems (and snow-removal systems). Shown here: welding in bank of coils to hot water line with TUBE-TURN Welding Tee at Capitol Annex Building, Frankfort, Kentucky. Contractor: B. A. Walterman Co., Cincinnati.

All-around Service. Your nearby Tube Turns' distributor will see that your needs in fittings (of all materials, types and sizes) are met promptly. He will also see that you get Tube Turns' engineering service on your piping applications.

WROUGHT IRON FITTINGS AVAILABLE FROM YOUR NEARBY TUBE TURNS' DISTRIBUTOR

90° ELBOWS

45° ELBOWS

180° RETURNS

TEES

CAPS

CONCENTRIC REDUCERS

ECCENTRIC REDUCERS

FLANGES

*"TUBE-TURN" and "tt" Reg. U.S. Pat. Off.

TUBE TURNS, Dept. B-1
224 East Broadway, Louisville 1, Kentucky
Please send Bulletin TT-787 on Wrought Iron Fittings.

Company Name _____

Company Address _____

City _____ *Zone* ____ *State* _____

Your Name _____

Your Position _____

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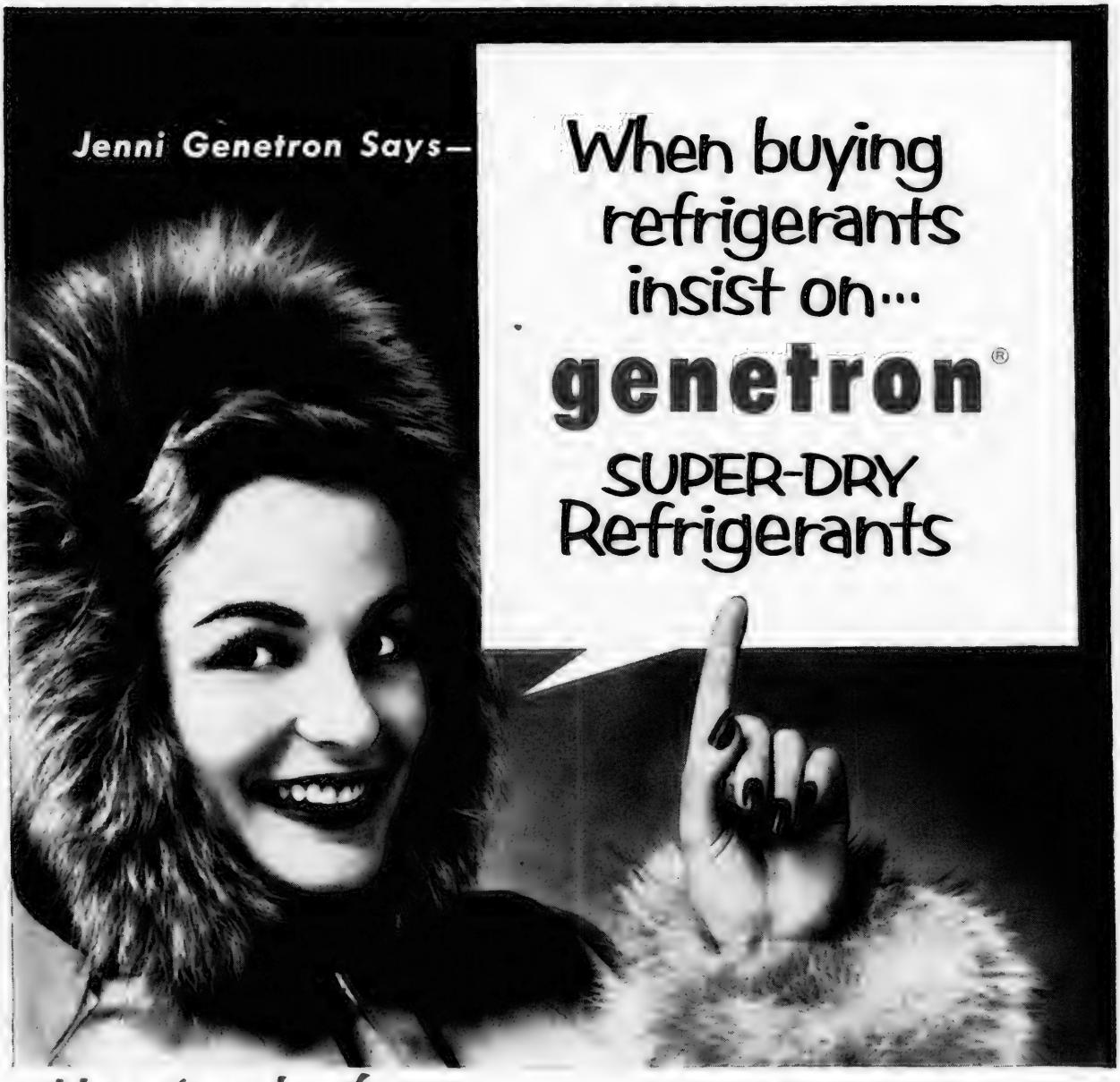
A DIVISION OF NATIONAL CYLINDER GAS COMPANY
LOUISVILLE 1, KENTUCKY

DISTRICT OFFICES: New York • Philadelphia • Pittsburgh Cleveland • Detroit • Chicago • Denver • Los Angeles San Francisco • Seattle • Atlanta • Tulsa • Houston Kansas City • Dallas • Midland, Texas



...Here's why!

- Guaranteed exceptionally low moisture content
- Non-corrosive to standard equipment materials
- Non-toxic, non-flammable, stable, safe
- Critical and freezing points well outside range of operating uses
- Solvent action on oil helps prevent solidification or congealing of lubricant
- Miscible with oil; aid in lubrication of equipment
- Identical and freely interchangeable with comparable fluorinated hydrocarbon refrigerants made by any other manufacturer

All over America! Wherever you are, call your Wholesaler for "Genetron" Super-Dry Refrigerants

Genetron Department

GENERAL CHEMICAL DIVISION

ALLIED CHEMICAL & DYE CORPORATION

40 Rector Street, New York 6, N. Y.

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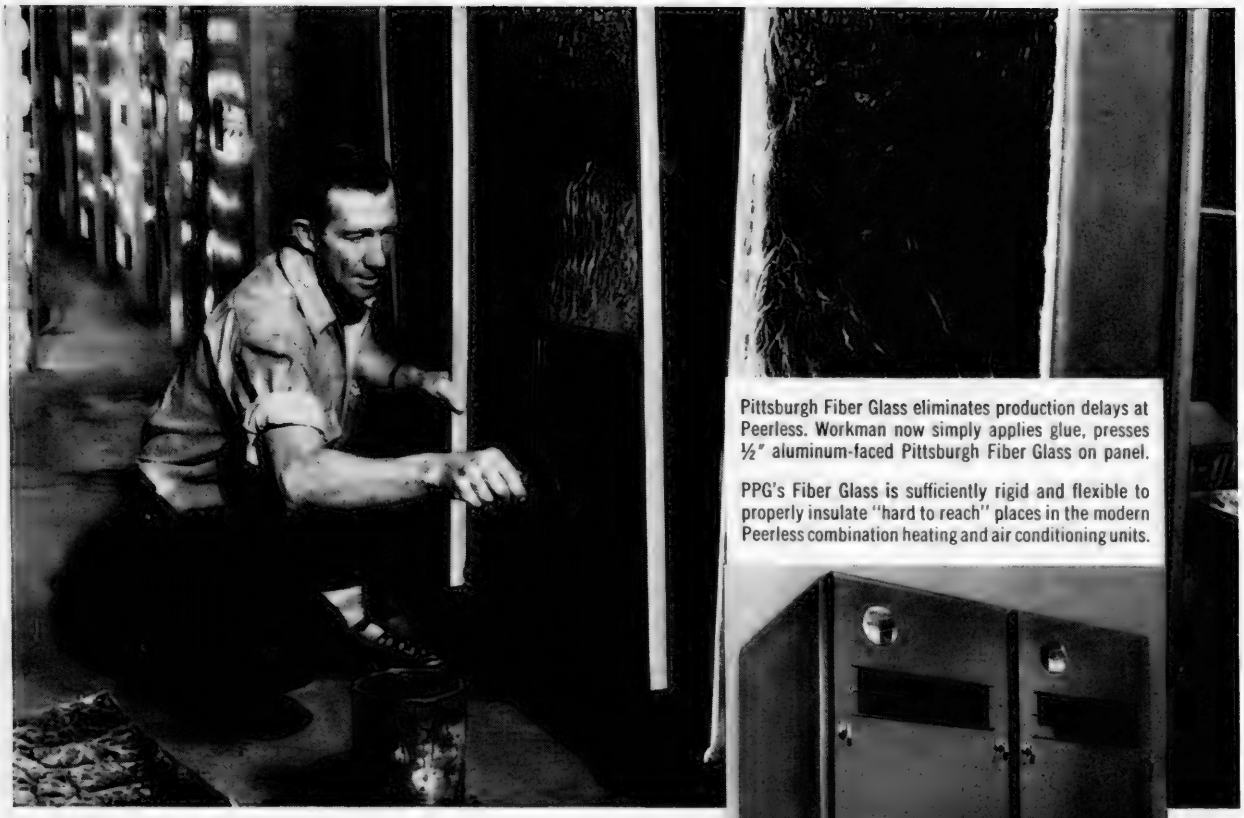
GC Allied Chemical



Pittsburgh Fiber Glass eliminates production delays at Peerless. Workman now simply applies glue, presses ½" aluminum-faced Pittsburgh Fiber Glass on panel.

PPG's Fiber Glass is sufficiently rigid and flexible to properly insulate "hard to reach" places in the modern Peerless combination heating and air conditioning units.

THE PEERLESS CORPORATION improves production, reduces labor and material costs with Pittsburgh Superfine Fiber Glass

Improved insulation quality and lower manufacturing costs? Those are the two important advantages The Peerless Corporation of Indianapolis, Indiana, gained for their complete line of coal, oil and gas-fired home furnaces and air conditioning units when they switched to Pittsburgh Superfine Fiber Glass insulation two years ago.

"Pittsburgh Fiber Glass improved our production efficiency, reduced material and labor costs, completely eliminated one manufacturing operation," says M. T. Cunningham, Plant Foreman.

"Superior insulating value, increased flexibility, consistency and dependability of Pittsburgh Fiber Glass has bettered the quality of our units, reduced paint failure, improved safety and made possible the insulation of sharp corners and hard-to-get-to places," states Mr. Frank Mutz, President of Peerless.

Are you completely aware of the many profitable benefits that Pittsburgh Superfine Fiber Glass can bring to your insulation requirements? If you manufacture or install furnaces, air conditioners or related ductwork, get the facts now. For general information, write for Bulletins F-100, F-185 and F-190, to Fiber Glass Division, Pittsburgh Plate Glass Company, One Gateway Center, Pittsburgh 22, Pennsylvania. For fast service on your specific problems, call the nearest Fiber Glass Division sales office listed here.

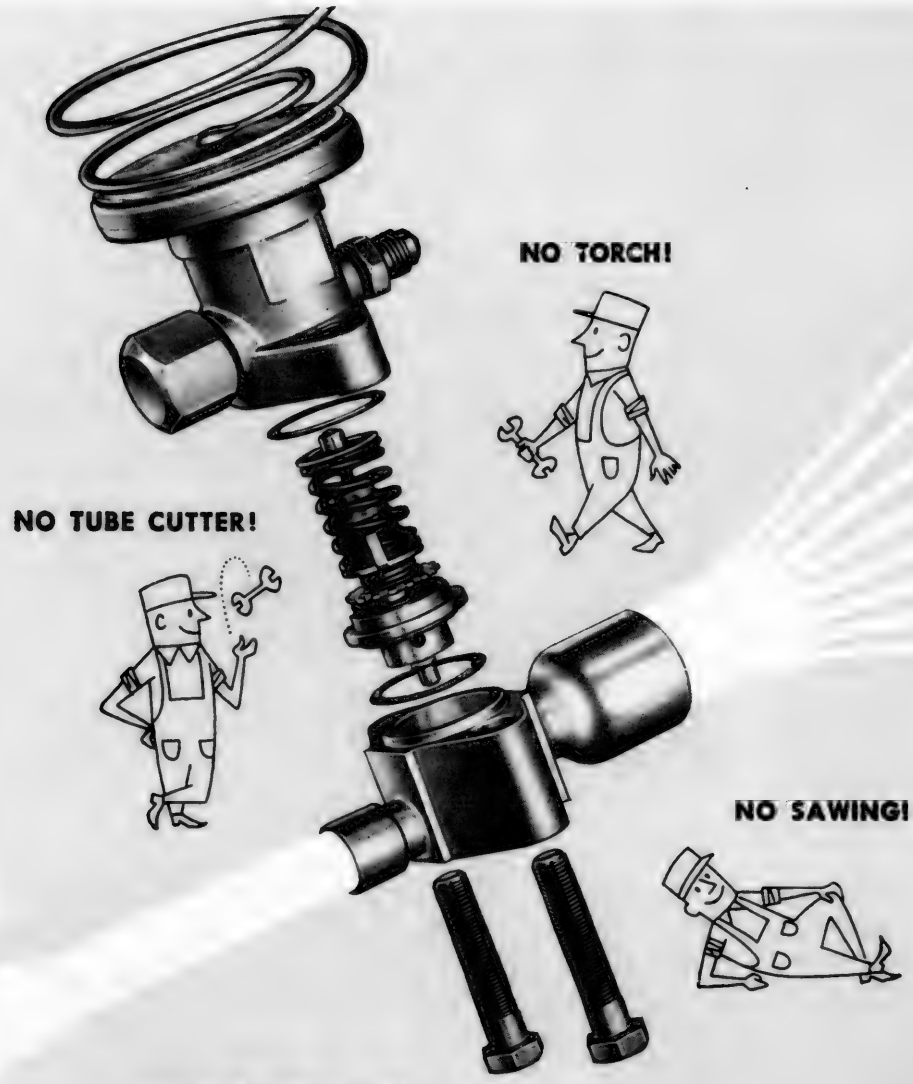
PITTSBURGH SUPERFINE IS A PRODUCT OF THE FIBER GLASS DIVISION OF PITTSBURGH PLATE GLASS COMPANY

Sales Offices are located in the following cities: Charlotte, Chicago, Cincinnati, Cleveland, Detroit, Houston, Los Angeles, New York, Philadelphia and St. Louis

FIBER PPG GLASS

PAINTS • GLASS • CHEMICALS • BRUSHES • PLASTICS

PITTSBURGH PLATE GLASS COMPANY



THE EASIEST JOB
ON ANY COOLING SYSTEM...
servicing ALCO "T" series thermo valves!

For cleaning, repair or capacity change: loosen two screws—raise the power element—lift out the cage. That's all! You never break the connections.

Designers and Manufacturers of Thermostatic Expansion Valves; Evaporator Pressure Regulators; Solenoid Valves; Float Valves; Float Switches.

see your ALCO wholesaler

ALCO VALVE CO.
859 KINGSLAND AVE. • ST. LOUIS 5, MO

engineered for service for life

THE MARK OF QUALITY

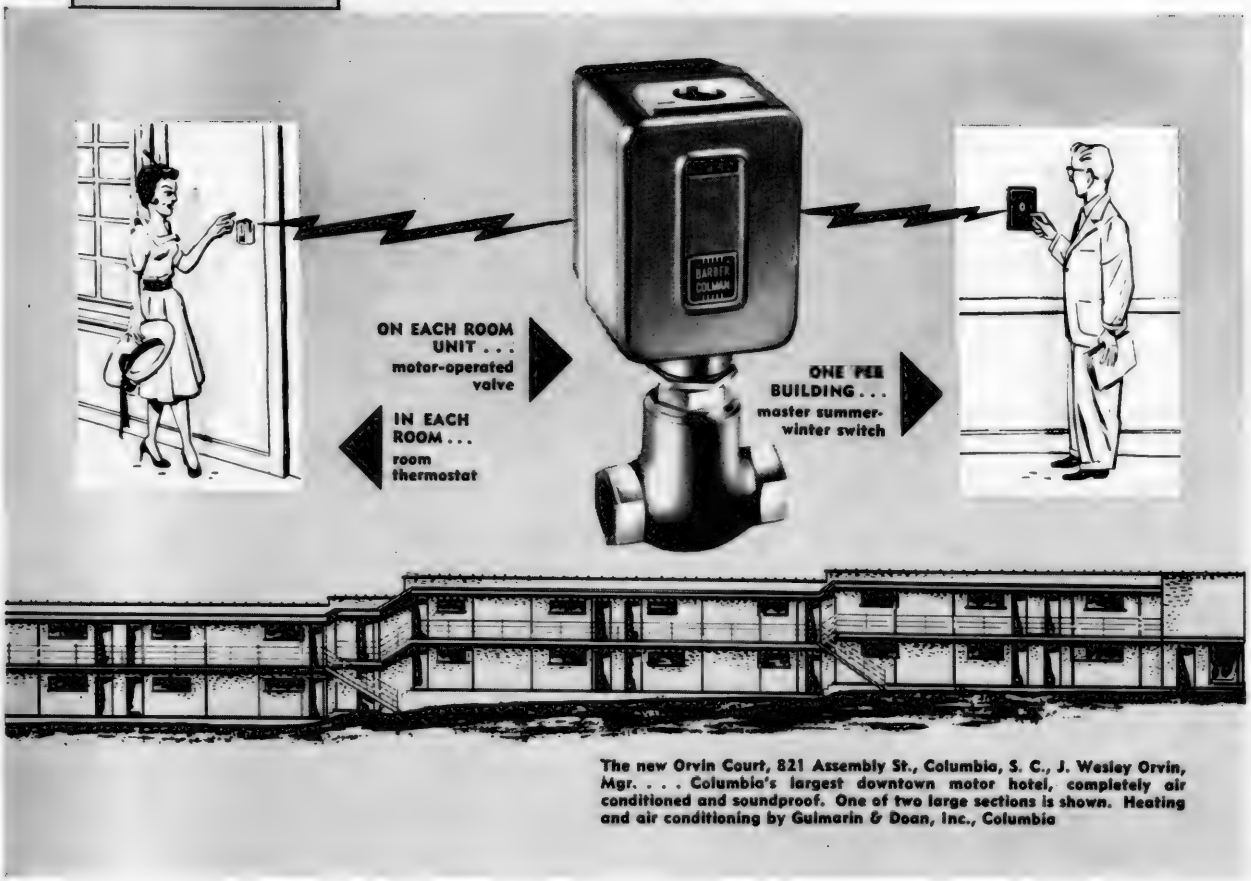
BARBER COLMAN

ELECTRIC-ELECTRONIC

Automatic Controls

Electrically

individual room control for heating and cooling *is this simple...*



The new Orvin Court, 821 Assembly St., Columbia, S. C., J. Wesley Orvin, Mgr. . . . Columbia's largest downtown motor hotel, completely air conditioned and soundproof. One of two large sections is shown. Heating and air conditioning by Guimarin & Doan, Inc., Columbia

With Barber-Colman Automatic Controls, Columbia, South Carolina's new Orvin Court achieves effective individual room control in the simplest possible form. Chilled water in summer and hot water in winter are piped to fan-coil unit located behind a grille in each room. One coil is used for both hot and chilled water. The fan runs continuously, providing good ventilation at all times. Effective temperature control for each room is achieved like this . . .

In each room — a Barber-Colman thermostat opens and closes motor valve as heating or cooling is required.

On each room unit — a dependable electric valve controls the flow of hot or chilled water into the coil of air conditioning unit. The electric motor operator is factory-sealed in an oil-filled case — doesn't require attention. Requires only two connecting wires.

In each building — a single summer-winter switch controls all thermostats on the circuit for change-over from heating to cooling.

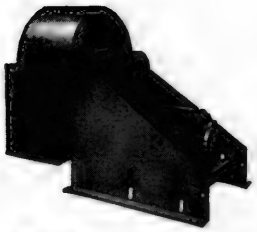
Write for Bulletin F-6801.

Barber-Colman Company

DEPT. C, 1302 ROCK ST., ROCKFORD, ILL., U. S. A.

Field Offices in principal cities

nyb



Nos. 76 and 91
Belted
Junior Fan

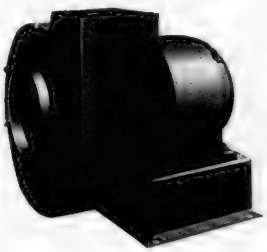
GENERAL PURPOSE FANS

Recommended for their ease of installation,

low maintenance cost and space saving features.

Portable, self-contained units of medium capacities for low pressure industrial and ventilating applications. Designed particularly for use with duct systems.

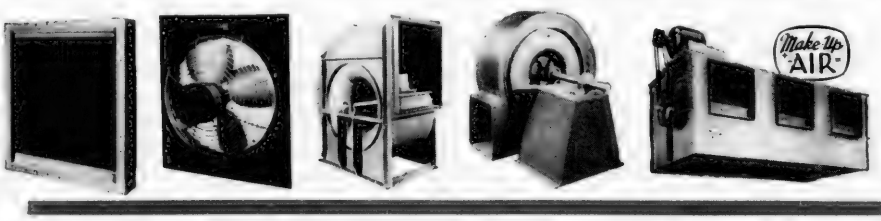
General Purpose Fans are made in three types and eight basic sizes with capacities from 1200 to 19,000 cfm. (Junior fans in five sizes from 160 to 4100 cfm). These include both direct connected and belt driven models.



No. 10 G. I.
Industrial Fan

with manganese bronze wheel, spark proof and acid resistant. For use in hazardous locations where explosive air mixtures are to be handled, and for handling hot gases and conveying materials in process. Two arrangements, two types of wheels. All fans reversible. Speeds up to 4500 rpm. For temperatures up to 350°.

nyb products have 65 years of manufacturing experience and engineering knowledge built into them. All ***nyb*** products are laboratory tested, accurately rated and fully guaranteed in strict accordance with standard test codes.



When working on your air handling problems, consult the *nyb* representative nearest you in our nationwide service or write for bulletins.

CERTIFIED RATINGS
ASSOCIATED BY N A F M

nyb **THE NEW YORK BLOWER COMPANY**

SALES OFFICES • 3165 SOUTH SHIELDS AVENUE • CHICAGO 16
FACTORY, LAPORTE, INDIANA

A-B Quality

The Sign of Quality Motor Control

Governair model SCU-25, 25-ton packaged air conditioner uses Allen-Bradley Bulletin 709 solenoid starters in sizes 0, 1, and 3.

Governair model PWD-30, 30-ton packaged water chiller uses Allen-Bradley Bulletin 709 solenoid starters in sizes 1 and 3.

ALLEN-BRADLEY TROUBLE FREE MOTOR CONTROLS ARE "STANDARD"

ON GOVERNAIR *Refrigeration Units*

REASONS WHY ALLEN-BRADLEY STARTERS ARE FIRST WITH REFRIGERATION AND AIR-CONDITIONING MEN

simple design

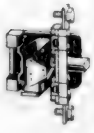
Only ONE moving part . . . the secret of trouble free switch operation.

dependable operation

No pivots, pins, hinges, or friction parts to cause starter trouble.

maintenance free contacts

Double break, silver alloy contacts never need cleaning or filing.



reliable overload relays

Provide continuously reliable motor protection irrespective of service.

Year after year Allen-Bradley controls gain in popularity especially among air-conditioning and refrigeration men . . . and there are good reasons. Allen-Bradley controls give continuously dependable service without maintenance over long periods of operation.

Extreme simplicity enables Allen-Bradley solenoid starters to provide trouble free service . . . only ONE moving part.

There are no hinges or pivots to bind and cause trouble . . . no pins or bearings to wear. And the cadmium silver alloy contacts never need cleaning, filing, or dressing. You can install Allen-Bradley controls . . . and forget them. Specify Allen-Bradley control—it stands for millions of trouble free operations.

Allen-Bradley Co., 1330 S. Second St.
Milwaukee 4, Wis.
In Canada—
Allen-Bradley Canada Ltd., Galt, Ont.

ALLEN-BRADLEY
SOLENOID MOTOR CONTROL
QUALITY

To the ENGINEER with a . . . TOUGH CORROSION PROBLEM

Novelty offers the engineering and fabricating facilities of the Novelon Lining Department. The latest advancements in linings of plastic, rubber, lead, copper and cement are available to answer tough corrosion problems in storing and processing water, acids, beverages, foods and most chemicals.

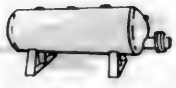
Let Novelty's combination of 50 years of fabricating vessels and the most advanced lining facilities be your assurance of selecting and building an enduring vessel. Write, telegraph or telephone your problem — today!

Write today on your company letterhead for reference catalog.

"Specify NOVELON LININGS"

NOVELTY
STEAM BOILER WORKS, INC

FIFTY YEARS OF FABRICATING
UNFIRED PRESSURE VESSELS



HOT WATER GENERATORS

STORAGE TANKS

SPECIAL LININGS

SPECIAL FABRICATION

NOVELTY STEAM BOILER WORKS, INC.
2031 KLOMAN STREET • PHONE PLAZA 2-0425 • BALTIMORE 30, MARYLAND

NOW G-E CEILING-MOUNTED PACKAGED AIR CONDITIONERS HELP YOU

SOLVE 2 PROBLEMS

1 SPACE

Now your scope of design can include the finest air conditioning without using a foot of vital floor space. Because new G-E Packaged Air Conditioners are fastened to the ceiling—or can be mounted on a shelf. And these trim units enhance any modern scheme. They're compact, self-contained—with no exterior parts. Motor, compressor and condenser are all sealed inside.

2 WATER

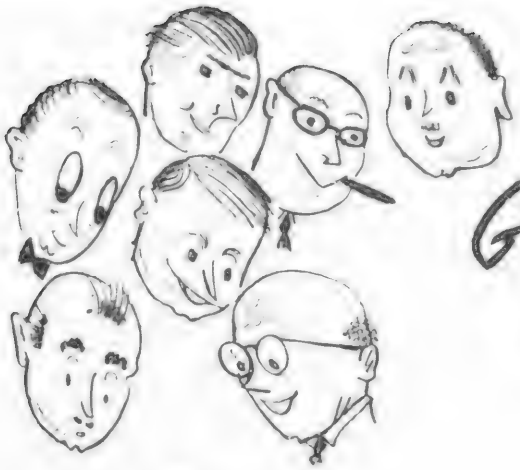
Where water restrictions present a serious problem, specify G-E ceiling-mounted units in air-cooled models available in 3 and 5 ton capacities. These models use no water—require only air and electricity. Water-cooled models also available in 3, 5 and 7½ ton capacities. For *year-round* comfort, all new G-E ceiling-mounted units may be equipped with coils for winter heating.

And, remember! G-E is the only complete packaged air conditioning line on the market. You can specify both floor- and ceiling-mounted models from a single manufacturer. For free booklet, "What Every Businessman Should Know About Weather Reflex", write General Electric Company, Commercial and Industrial Air Conditioning Department, Bloomfield, New Jersey.

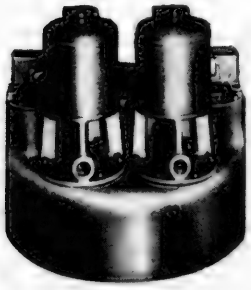
Packaged AIR CONDITIONERS

Progress Is Our Most Important Product

GENERAL ELECTRIC



Get the most from your Pump investment



TYPE CVS—duplex unit
TWO FLOAT SWITCHES

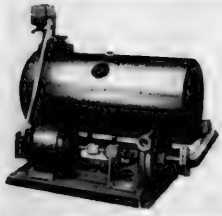
Recommended for heavy duty service. Separate control mechanism for each pump motor—or one float which controls automatic alternator.

There's a wide range of types and capacities for every heating pump need. Let Skidmore advise you on your next tough job.

TYPE UV

Type UV Condensation Pump is designed for below floor level returns, and is built in single and duplex units.

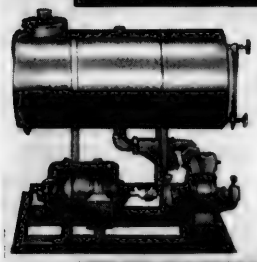
Write for ***Bulletin No. 19-A***



TYPE HS

Type HS Pump is recognized for its dependable low operating cost. Capacities range from 1,000 to 65,000 sq. ft. EDR and pressures from 10 to 75 pounds.

Write for ***Bulletin No. 14-A***



TYPE TM

Type TM High Pressure Turbine Pump. Designed for pressures up to 150 pounds and boilers to 250 H.P.

Write for ***Bulletin No. 17***

THE SKIDMORE CVS SETS THE PACE IN PUMP PERFORMANCE!

Send for the NEW Bulletin

The CVS vertical pump offers more for your money—mechanical shaft seal—greater range of discharge pressures — still retains compact design and light weight.

TYPE CVS

Representatives in principal cities.

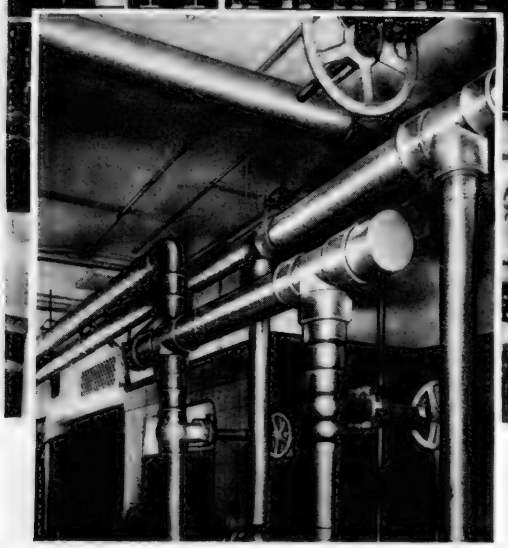
Skidmore Pumps have set a Standard of performance and dependability since 1921.

SKIDMORE PUMPS

SKIDMORE CORPORATION
ST. JOSEPH, MICHIGAN

IN THE DAYTON-BILTMORE HOTEL...

(A HILTON HOTEL)



The chilled water supply and return lines in basement are 3, 4, and 5 inch Chase Copper Water Tube and Solder Joint Fittings. Gate valves also by Chase.

AIR CONDITIONING WITH CHASE® TYPE L COPPER WATER TUBE *Exclusively!*

It's another 100% Chase job! From roof to basement, the new air conditioning installation at the Dayton-Biltmore Hotel used over 20,000 feet of Chase Type L Copper Water Tube and more than $3,000 worth of Fittings.

As in other refrigeration installations, Chase Copper Tube and Fittings saved time and labor for the Dayton-Biltmore's air conditioning contractor, the York Corporation. That's because the precise tolerances of Chase Type L Tube and Solder Joint Fittings assure quick, accurate assembly and a pressure-tight system.

You can get hard temper Chase Type L in ¼" to 12" sizes. Comes in 20 foot lengths. Order today from the Chase Wholesaler nearest you!

Chase®

BRASS & COPPER CO.

WATERBURY 20, CONNECTICUT

SUBSIDIARY OF KENNECOTT COPPER CORPORATION

The Nation's Headquarters for Brass and Copper

Atlanta Baltimore Boston Charlotte Chicago Cincinnati Cleveland Dallas Denver Detroit Grand Rapids Houston Indianapolis Kansas City, Mo. Los Angeles Milwaukee Minneapolis Newark New Orleans New York Philadelphia Pittsburgh Providence Rochester St. Louis San Francisco Seattle Waterbury

Shows how to solve duct liner equations without a slide rule!

"How much of this duct should I line to attenuate 15 db of fan noise?"

Common problems like this can easily be solved when you have Gustin-Bacon's new 8-page brochure on Ultralite Duct Insulation and Duct Liner. And you won't need a slide rule — because Gustin-Bacon has plotted for you the values for $12.6a^{1.4*}$ power at various absorption coefficients, as well as giving you the sound absorption coefficients of Ultralite Duct Liner at various frequencies. In addition, this new brochure will show you a new easy way to solve the problem of lining ducts that are not long enough to obtain the required decibel reduction.

The new booklet also contains a wealth of helpful information about Ultralite Duct Insulation and Duct Liner. You'll find specifications and instructions for insulating heating ducts . . . cooling or combination ducts . . . forming duct liner with the metal . . . applying surface finishes, both indoors and out. This information makes it easier for you to specify and apply Ultralite than any other duct insulation on the market. Ultralite is the only insulation of long glass fibers . . . the first flexible glass fiber duct insulation on the market . . . the easiest and most economical duct insulation you can use. Get the facts from your nearby distributor, or write today.

WRITE TODAY FOR YOUR FREE COPY

*Equation on pg. 942 of 1955 American Society of Heating, Ventilating & Air Conditioning Engineers Guide or in Gustin-Bacon's new Duct Brochure.

GUSTIN-BACON *Manufacturing Company* GUSTIN gb BACON

Thermal and acoustical glass fiber insulations • Pipe couplings and fittings • Molded glass fiber pipe insulation

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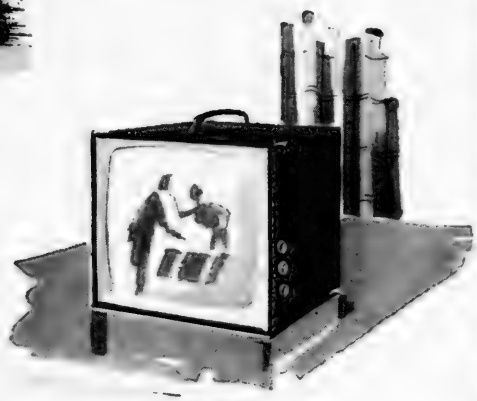
ANNOUNCING

UNARCO®

DEALER

$100,000.00 in



EVERY DEALER A WINNER!

You choose the awards you want—

maybe it's a portable TV set or a 3-dimensional camera...a "Thunderbird"...a fur coat for your wife...a fully equipped panel truck...or a hunting and fishing trip to your favorite haunt. Here's your chance to obtain those unusual gifts you would like to own but somehow never buy yourself. Every dealer is a winner and there are thousands of gifts, including beautiful jewelry, gifts for the family and articles for the home.

This is how you qualify:

For every ton of UNARCO packaged air conditioning you handle, you will receive 800 Plu$ Points. These points can be redeemed for any of thousands of items. This is not a contest—every dealer can win one or more prizes. THIS IS A BONUS—another UNARCO "plus" for dealers of packaged conditioners. THIS IS IN ADDITION to the biggest profit opportunity in the industry.

UNARCO ROYAL-AIRE

UNARCO DYNA-PAC

UNARCO ROYAL-AIRE, JR.

WHAT UNARCO OFFERS ITS DEALERS:

1. A COMPLETE LINE OF PACKAGED AIR CONDITIONING, including the famous UNARCO ROYAL-AIRE, ROYAL-AIRE, JR., and the new UNARCO DYNA-PAC.
2. A "READY MARKET" created by NATIONAL ADVERTISING, implemented with DIRECT MAIL PROMOTIONS and POINT-OF-SALE ADVERTISING.
3. The UNARCO "50-50" STOCKING DEALER COOPERATIVE ADVERTISING PROGRAM for local advertising in newspapers, TV and radio.
4. A COMPLETE FINANCE PLAN available to all dealers handling UNARCO equipment.
5. The opportunity for dealers to represent UNARCO and build their business selling QUALITY AIR CONDITIONING at the MOST ATTRACTIVE PRICES AVAILABLE ANYWHERE.
6. Full participation for every dealer in the big UNARCO $100,000.00 DEALER PLU$ PLAN.

THE 1956

PLU$ PLAN

AWARDS FOR DEALERS!

GET A HEAD START . . . *send in this "check"!*

IT IS WORTH 800 POINTS TO YOU. Without any obligation send in this UNARCO PRIZE BANK CHECK. It will be countersigned and returned to you and you will be credited with 800 Plu$ Points toward your bonus awards (limit 1 to a dealer). In addition, you will receive full information about the big UNARCO DEALER PLU$ PLAN.

UNARCO PRIZE BANK

UNION ASBESTOS & RUBBER COMPANY
Dept. 104
332 So. Michigan Ave.
Chicago 4, Ill.

Feb. 13, 1956

Pay to the order of

NAME.....

ADDRESS.....

CITY.....STATE.....

800 POINTS

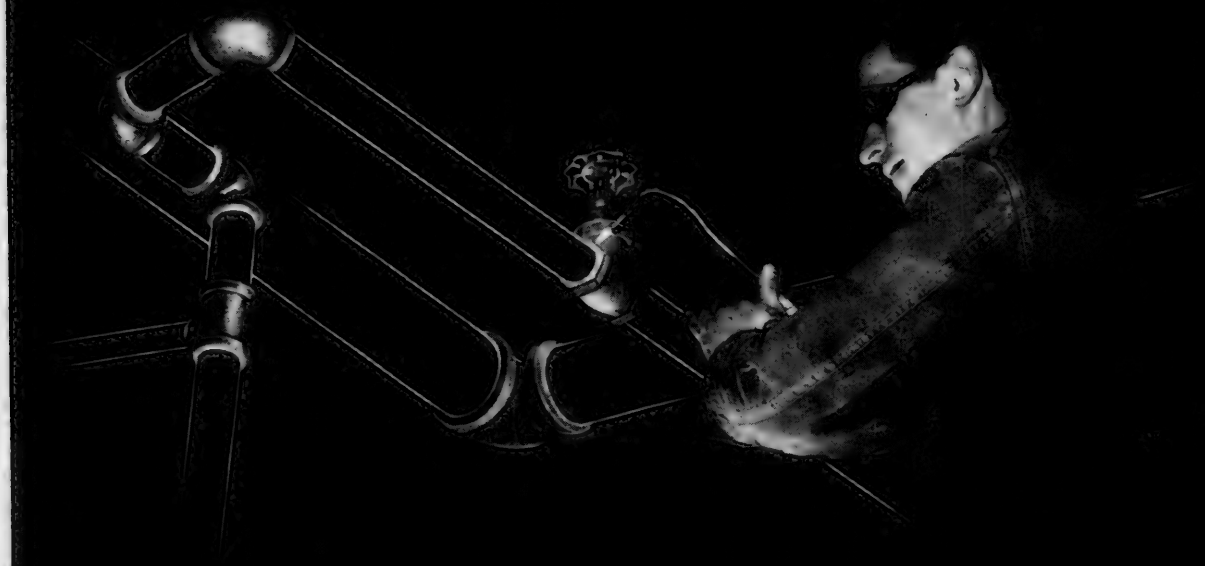
AWARDED BY: UNARCO DEALER PLU$ PLAN

.....AUTHORIZED SIGNATURE.....

UNARCO®

DESIGNERS
...ENGINEERS
FABRICATORS OF
AIR CONDITIONING EQUIPMENT

WALWORTH



WALSEAL® VALVES AND FITTINGS

Cutaway view of a Walseal Tee showing: factory-inserted ring of silver brazing alloy; fillet of silver brazing alloy that appears upon completion of Walseal joint; cutaway view of the completed joint showing that silver brazing alloy has flowed in both directions from the factory-inserted ring.

Better because . . . **There's no guesswork when a silver-brazed joint is made with a Walseal fitting. Sil-Fos alloy, which appears as a fillet at the face of a Walseal joint, comes from rings which have been factory-inserted in the end connections of Walseal fittings. The bright silver alloy fillet that you can see assures full penetration of alloy for a permanently leakproof joint.**

Walseal is a registered trade mark identifying bronze valves and fittings manufactured by the Walworth Company. Walseal products have factory-inserted rings of silver brazing alloy in threadless ports. Walseal joints can be made only with Walseal valves and fittings.

If you're piping water, oil, steam, air, oxygen, nitrogen, helium or other industrial gases or refrigerants through brass, copper, or copper-nickel pipe, you'll want to investigate Walseal – available in complete lines of bronze valves and fittings in four distinct pressure ranges – from 0 to 5000 psi. working pressure*. Your copy of Circular 115 will be sent on request . . . see your near-by Walworth Distributor today, or write to: Walworth Company, General Offices, 60 East 42nd Street, New York 17, N. Y.

*Walseal fittings and valves are being used at sub-zero temperatures as low as —350 F.

Make it "a one-piece pipeline" with WALSEAL

WALWORTH

Manufacturers since 1842

valves . . . pipe fittings . . . pipe wrenches

60 East 42nd Street, New York 17, N. Y.

DISTRIBUTORS IN PRINCIPAL CENTERS THROUGHOUT THE WORLD

For Winter and Summer Air Conditioning

SELL DETROIT'S COMPLETE CONTROL SYSTEM!

DETROIT CONTROLS' *Duo-Classic* System gives Simplified Control for Year-'round Air Conditioning

ONE Thermostat
ONE Function Selector
ONE Universal Control Panel
ONE Simple Installation Procedure

Duo-Classic simplifies every job!
Its modern styling, ease of use and simple installation make the Duo-Classic Control system easy to sell.

The Universal Control panel, prewired with high voltage and low voltage terminals for direct connection of the power supply and every component part of the entire heating-cooling system, is easy to install.

Since the Detroit Control Panel and Thermostat are designed for universal application, inventory problems of equipment manufacturers and wholesalers are simplified.

For complete, all-season air conditioning control, you need only install the DETROIT Universal Control Panel and the Duo-Classic thermostat. Build sales and satisfaction!

DETROIT CONTROLS supplies a complete line for the heating, air conditioning and refrigeration industries.

DETROIT CONTROLS CORPORATION
5900 TRUMBULL AVE. • DETROIT 8, MICHIGAN
Division of AMERICAN RADIATOR & STANDARD SANITARY Corporation

Representatives in Principal Cities • Canadian Representatives:
RAILWAY AND ENGINEERING SPECIALTIES, LTD.,
Montreal, Toronto, Winnipeg.

AUTOMATIC CONTROLS *for*
AIR CONDITIONING • DOMESTIC HEATING • REFRIGERATION • AVIATION • TRANSPORTATION • HOME APPLIANCES • INDUSTRIAL USES

when you need a *Special* motor...contact DOERR

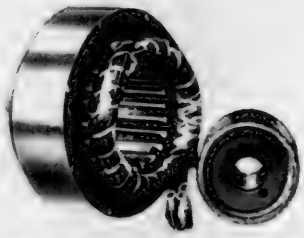
Over 95% of Doerr's production consists of motors with one or more special features

Rely on Doerr's long and specialized experience to solve your problems. List your specifications. Then let Doerr prove how easy it is to select and receive on-time delivery of motors that *exactly* fill your need.

Special features and modifications of all types are available. Present castings, windings and mountings can be adapted to solve new design problems at minimum cost. In addition, Doerr makes a complete line of standard NEMA ratings, every motor precision-built to the highest standards of quality.

Discover now why leading machinery builders consistently re-order Doerr Motors. Before you buy, just write or call us in for a talk. More than likely we can furnish the top-quality power package you want.

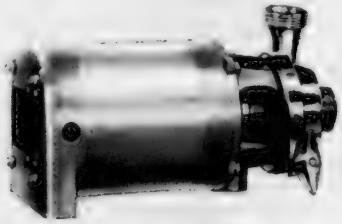
Gearmotor for agitator drive on bulk milk cooler. Stainless steel shaft. Leak-proof seal.



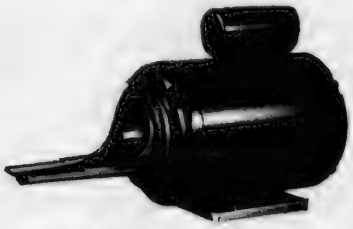
Special diameter motor parts for use in rotary oil burners. Range ½ to 5 HP.

Floor machine motor. Low contour—high torques—pleasing appearance.

Doerr motor with special mounting used on leading 10" tilting arbor saw.



Sanitary dairy pump motor . . . Doerr-Designed to customer's specifications.



Special pump bracket eliminates mounting and alignment problems. Saves space and weight.

Special and standard electric motors from 1/30 to 5 HP that exactly meet your needs.

You Get MORE with Doerr!

Write for New Bulletin on Electric Motors Without Obligation

DOERR
Electric Corporation
CEDARBURG, WISCONSIN

Executive Office, Wyeth Laboratories, Radnor, Pa.

Turn page, for more about Tru-Perimeter Heating with Custom Webster Walvector.

CUSTOM
Webster
WALVECTOR
REG. U. S. PAT. OFF.

(*Above*) Main Lobby, Wyeth Laboratories, Radnor, Pa. Custom Walvector enclosure beneath transom window has grilled lower inlet and top outlet grille.

(*Left*) Machine Shop. Custom Walvector enclosure extends over edge of wall.

Tru-Perimeter Heating Comfort

with Built-in Beauty

Custom Webster Walvector® becomes an integral part of modern architectural design . . . ends need for wall-finishing behind enclosures, provides built-in sills beneath windows. Custom-designed for distinctive appearance in executive offices . . . yet sufficiently standardized for economical application throughout industrial, commercial or institutional buildings. For steam or forced hot water heating. Ask your Webster Representative about Custom Walvector, or write us.

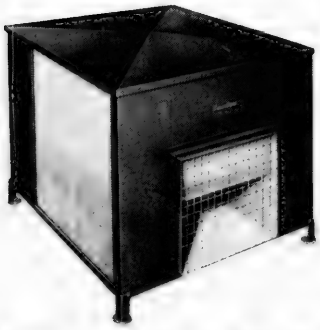
CUSTOM *Webster* WALVECTOR

WARREN WEBSTER & COMPANY, CAMDEN 5, NEW JERSEY

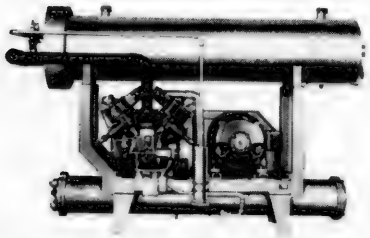
LOCATED NEAR YOU — TO HELP YOU. Webster Representatives in these 66 U.S. Cities: Albany, Atlanta, Atlantic City, Baltimore, Bethlehem (Pa.), Birmingham, Boston, Buffalo, Butte, Chattanooga, Chicago, Cincinnati, Cleveland, Columbia, Columbus, Dallas, Davenport, Dayton, Denver, Des Moines, Detroit, Grand Rapids, Harrisburg, Houston, Indianapolis, Kansas City, Kingston (Pa.), La Porte (Ind.), Little Rock, Los Angeles, Louisville, Lubbock, Memphis, Milton (N. Y.), Milwaukee, Minneapolis, Nashville, Newark, New Haven, New Orleans, New York, Oklahoma City, Omaha, Orlando, Philadelphia, Pittsburgh, Portland, Raleigh, Richmond, Roanoke, Rochester, Saginaw, St. Louis, Salt Lake City, San Antonio, San Francisco, Seattle, Spokane, Springfield (Mass.), Syracuse, Toledo, Trenton, Tulsa, Washington, Wichita, Wilmington . . . In Canada, Darling Brothers, Ltd., Montreal.

New, completely air-conditioned headquarters of Wyeth Laboratories, heated by Custom Webster Walvector with forced hot water. Exterior walls are green-tinted glass with porcelainized steel paneling. Total building space: 170,000 sq. ft. Architect: Skidmore, Owings & Merrill, New York. Engineer: Seelye, Stevenson, Value & Knecht, New York. General Contractor: George A. Fuller Co., New York. Mechanical Contractor: W. M. Anderson Co., Philadelphia.

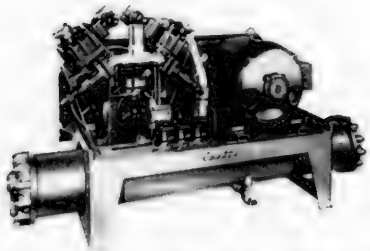
Curtis covers the field . . . means more profits for you!



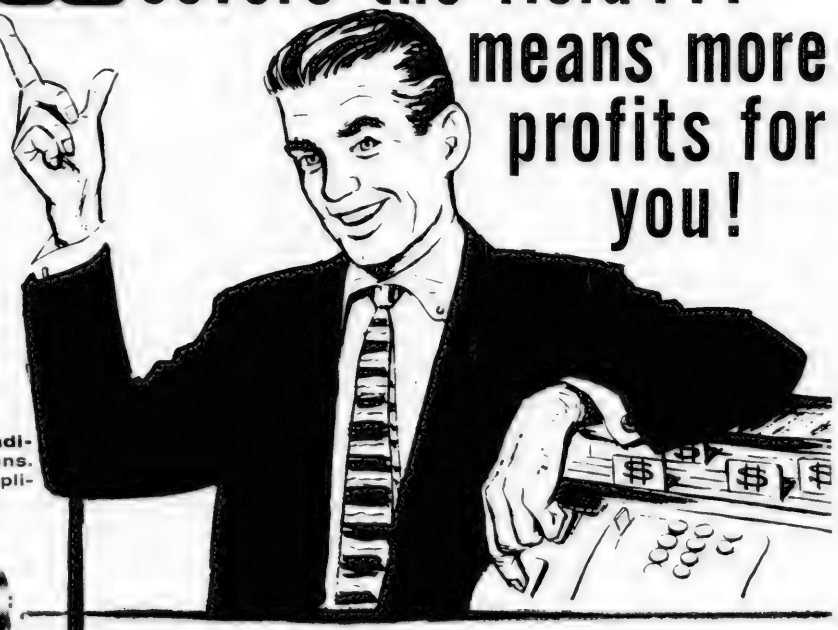
Packaged Air Cooled Air Conditioning Units—2 through 7½ tons. Residential and Commercial applications.



Packaged Liquid Chillers—7½ to 100 tons—F-12 or F-22. With room console units to provide controlled cooling and heating without duct work.



Condensing Units up to 100 tons—F-12 or F-22.



There's additional profit when you sell the complete Curtis line. Curtis equipment sells easily because it is backed by one of the oldest and most reliable names in the business and it's *competitively priced.*

Curtis-built compressors have an enviable record of trouble-free performance, long life and high efficiency.

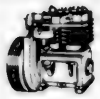
Curtis Air Conditioning and Refrigeration equipment is nationally advertised to make your selling job easier.

You can count on Curtis for Sales Plus every time.

Air Handling Units . . . Cooling Towers and Evaporative Condensers to match.

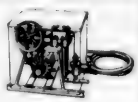
Remember You can COUNT on **Curtis**

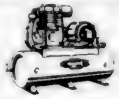
MANUFACTURING COMPANY
Refrigeration Division
1999 KIENLEN AVE., ST. LOUIS 20, MO.


INDUSTRIAL AIR COMPRESSORS

AUTO LIFTS

AIR CYLINDERS


CAR WASHERS

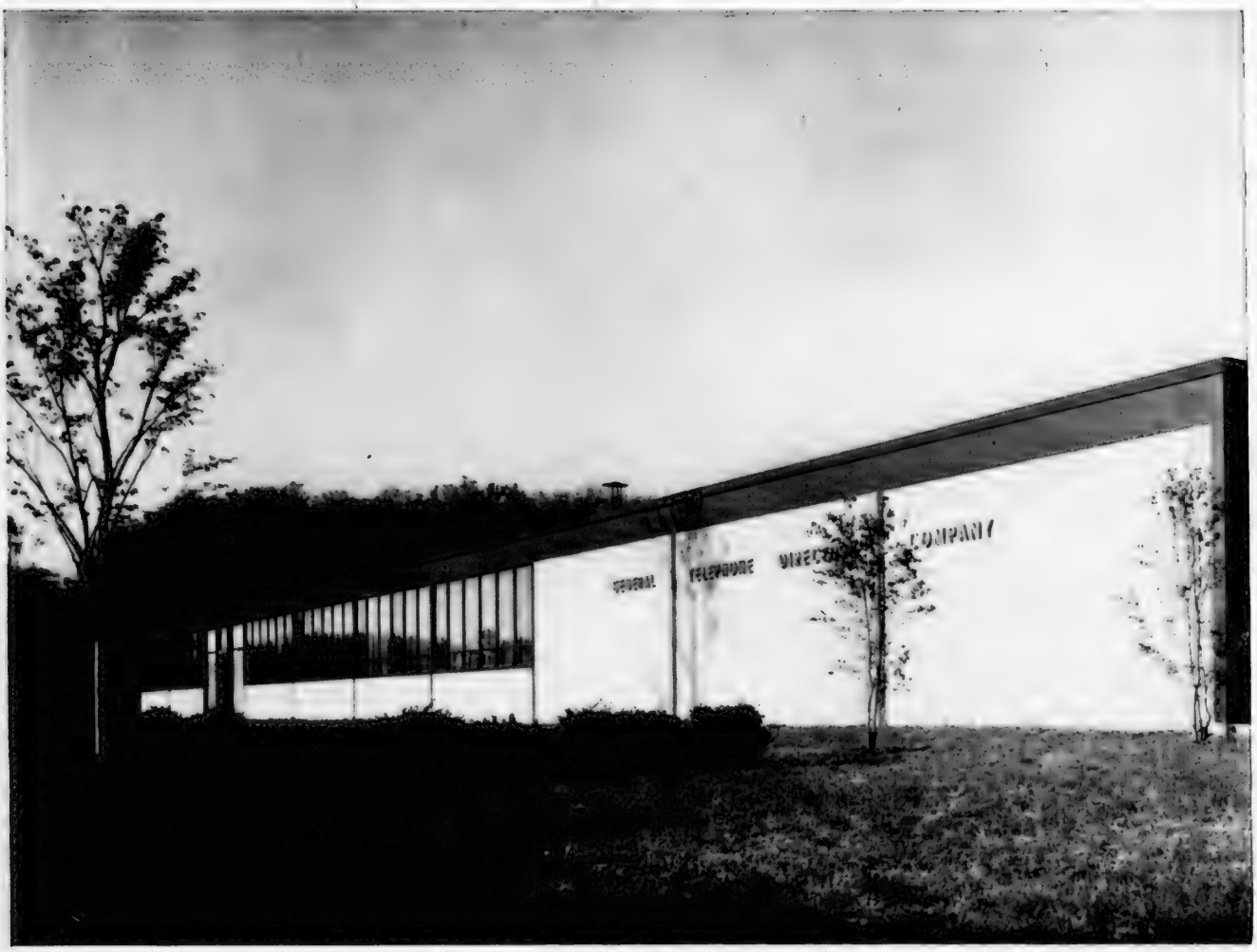

AUTOMOTIVE AIR COMPRESSORS

1854 1956 our 102ND year OF SUCCESSFUL MANUFACTURING EXPERIENCE

CM-4

Temperature control story of a modern printing company

How Honeywell Electronics cuts costs,



General Telephone Directory Company, Des Plaines, Ill. (a subsidiary of General Telephone Corporation). Architects-engineers: Pace Associates. General contractor: Turner Construction Company. Heating and air conditioning contractor: Economy Plumbing and Heating Company.

Printing and paper storage area of General Telephone Directory Co. dramatizes the scope of the control job necessary in the building. In addition to maintaining ideal comfort levels, humidity must be controlled to permit most efficient conduct of printing operations.

Other major advantages of the installation are:

. . . ***big savings on cooling***—outside air is used to help cut costs of refrigeration.

. . . ***big savings on maintenance***—with electronics only one man is needed to maintain all mechanical equipment.

. . . ***an outdoor thermostat*** anticipates weather changes in winter, preventing cold weather chill.

. . . ***central control panel*** gives one man a single check and adjustment point.

. . . ***automatic sequencing***—from heating to ventilating to cooling. Comfort is controlled automatically by a single thermostat. No need for special separate thermostats.

. . . ***unusual stability*** is achieved by use of three-thermostat team—outdoors, in the space, in discharge air.

improves air conditioning system efficiency

Big-system conveniences, important operating economies, comfort—you can provide them at reasonable cost with Honeywell Electronic Temperature Control.

GOOD performance of commercial air conditioning depends on good control. Not until the recent development of Honeywell Electronics was the *best* air conditioning control economically feasible for installations of moderate size.

Now it's possible for facilities such as those of General Telephone Directory Company, Des Plaines, Illinois, to have an air conditioning system with features completely modern —features that once were restricted logically to much larger installations.

These features, explained briefly above make possible benefits that only Honeywell Electronic Customized Temperature Control can provide at sensible cost. For General Telephone they make possible an ideal indoor environment—both for the comfort of employees and for printing processes so dependent on precise control of temperature and humidity.

These benefits suggest some of the ways Honeywell Electronics can help you give your clients unprecedented comfort, convenience, economy—in heating, ventilating, air conditioning and industrial control, in any building, new or existing.

Call your Honeywell office for a new booklet that tells more fully how to apply electronics to your clients' control problems —and for information on the economical Honeywell Periodic Maintenance Plan. Or if you prefer write Honeywell, Dept. HV-3-25, Minneapolis 8, Minnesota.

MINNEAPOLIS **Honeywell**

Electronic Controls

112 offices across the nation

These customers will drive in . . .

when you have snow melting!

"Not just a convenience but a *distinct competitive advantage!*" . . . that's what merchants are saying about snow and ice removal systems for super markets, shopping centers, service stations, department stores and other commercial establishments selling to the public.

Clean, bare driveways, parking areas and sidewalks (contrasted with snowy, slushy street approaches and *un*cleared competitors' places) become a strong *invitation* for shoppers to "turn in" . . . to do business where they are so obviously wanted. That's not just theory, but *fact*, proved statistically by progressive businesses where steel pipe snow melting systems are at work.

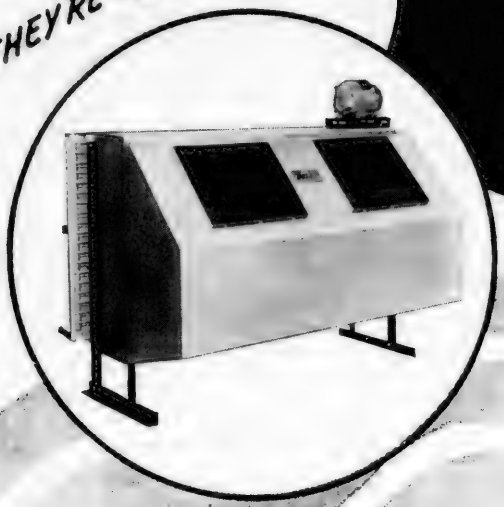
Yes, *steel pipe* is the first choice for these installations. The known economy of steel pipe makes investment in a snow melting system economically practical. And in service, steel pipe has a performance record proved in more than 60 years in hot water and steam heating applications. Add to this the advantages of formability and weldability for coil fabrication and you know why steel pipe is the most widely used pipe in the world . . . for snow melting, heating, plumbing, fire sprinkler systems, power, steam and air transmission.

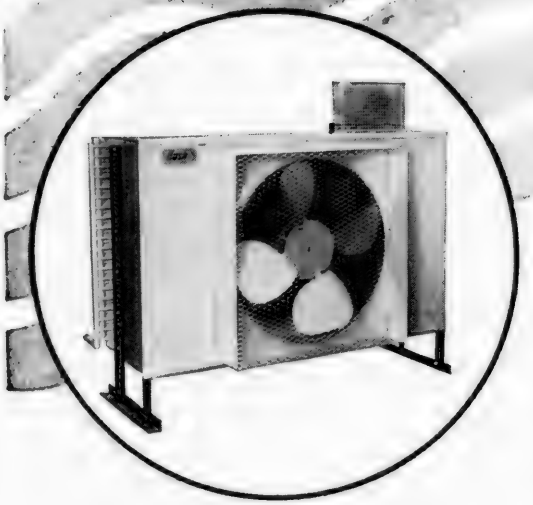
Send for the free 32 page booklet "Steel Pipe Snow Melting and Ice Removal Systems."

Committee on
STEEL PIPE RESEARCH
AMERICAN IRON AND STEEL INSTITUTE
350 FIFTH AVENUE, NEW YORK 1, N.Y.

Steel Pipe is First Choice

NEW 'BC' UNITS EXTEND RANGE OF BUSH AIR COOLED CONDENSERS to 20 TONS...



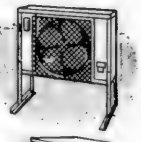


NEW Bush 'BC' Blower Condensers permit air conditioning and refrigeration systems to operate *without water* . . . provide the answer to excessive water costs, limited supply, excessive impurities or disposal problems.

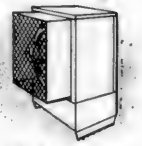
Available in capacities up to the 20 Tons, new Bush 'BC' Blower Condensers feature *low noise level . . . quiet operation.*

Patented Inner-Fin coil construction, *a Bush exclusive,* makes these the most compact units on the market. Units are easy to install, have rugged all-steel cases with durable rust-resistant finish . . . are available arranged with either blower fan or propeller fan.

The BUSH line of water-savers, most complete in the industry, also includes:



'CDT' COPPER DECK COOLING TOWERS with all copper decking. **'IEC' INNER-FIN EVAPORATIVE CONDENSERS** featuring patented inner-fin coils. Both units available with blower or propeller fan. Capacities from 3 to 90 Tons.



'PFC' PROPELLER FAN CONDENSERS — Two basic models, 2.2 Tons and 3.3 Tons can be combined by mounting in banks to obtain any desired tonnage.

'PS' PRESSURE STABILIZERS — automatically maintain satisfactory head pressure when air cooled condensers operate outside in low ambient temperatures.

Write direct for complete information or contact your experienced BUSH representative for valuable engineering and application assistance.

BUSH MANUFACTURING COMPANY • West Hartford 10, Conn.

RIVERSIDE • CALIFORNIA

BUSH

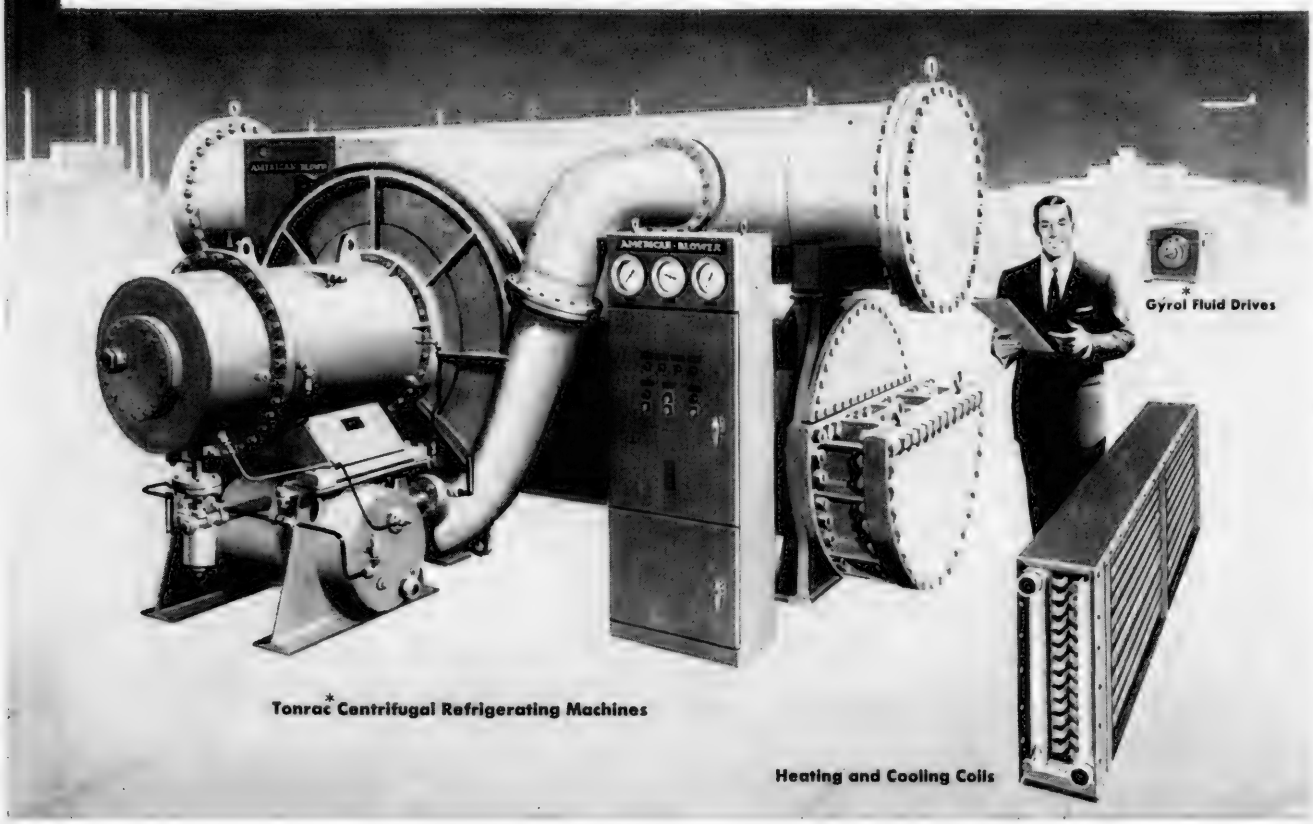
How to pick the right air condition

First: Call in an expert. There are more than 300 of them on our staff . . . skilled American Blower factory and sales engineers from all parts of the country. Each has the know-how and experience to help you select and apply the exact equipment you need—whether it's for a large-scale central or zone system, or a system for a smaller store, showroom, or industrial plant.

Second: Buy dependable equipment. A complete range of individual air conditioning, air handling, heating, and cooling components is available from American Blower to provide the last word in indoor comfort conditioning . . . products which are designed, engineered, and manufactured to work together . . . products which have proved dependable and efficient in thousands of important installations in all parts of the world.

Call in an American Blower sales engineer to help you pick the right air conditioning equipment for *your* business. Buying from a

* Trademark



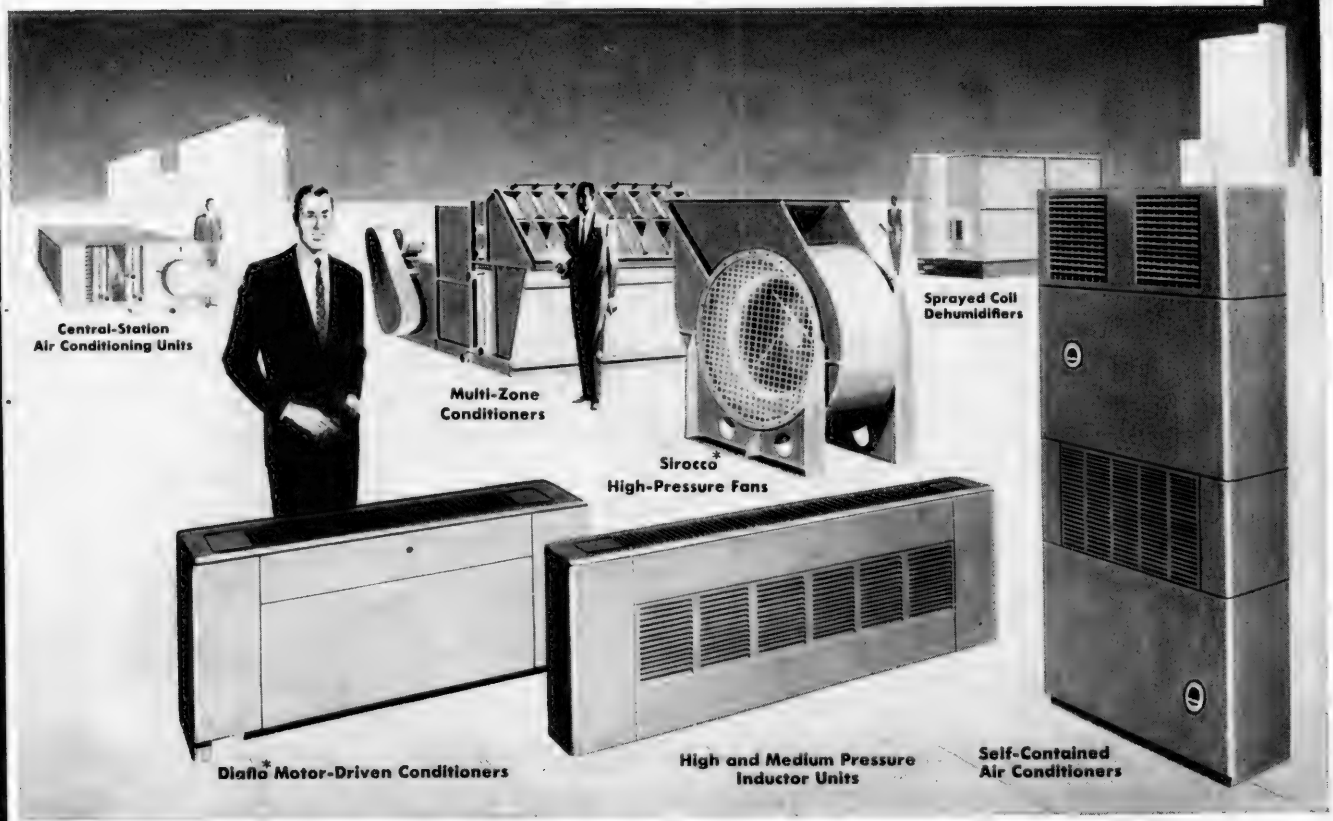
ing equipment for your business

single source gives you a balanced system; pinpoints responsibility for quality, performance, delivery dates . . . saves you time and money. Just get in touch with your nearest American Blower branch office—or, in Canada, your Canadian Sirocco branch office.

AMERICAN BLOWER CORPORATION, DETROIT 32, MICHIGAN
CANADIAN SIROCCO COMPANY, LTD., WINDSOR, ONTARIO
Division of AMERICAN-Standard

AMERICAN 75 BLOWER

Air conditioning equipment for every business



GET PEAK PERFORMANCE
THRU and THRU

buy Sporlan Catch-Alls

The Perfect Filter-Drier
with the Famous Molded Porous Core

Yes, it's easy to see why *only* Sporlan Catch-Alls *can* offer you Thru and Thru Peak Performance.

One look at these famous molded porous Catch-All cores, with their huge tri-dimensional filtering areas, and you know why Sporlan offers Thru and Thru Filtering... instead of just ordinary straining.

You can see, too, why they cannot powder ... cannot pack, and why the refrigerant cannot by-pass or channel around them.

Being molded of minute particles of a highly efficient desiccant, double activated, then immediately sealed... they dry the refrigerant down to an extremely low end point, a point so low that any remaining moisture is absolutely harmless.

Harmful corrosive acids found in most systems today are adsorbed and retained within the cores themselves.

So... if you want perfectly clean, perfectly dry refrigeration and air conditioning systems... Buy Sporlan Catch-Alls, the Perfect Filter-Drier, and Get Peak Performance Thru and Thru.

Ask your wholesaler for the Sporlan Bulletin 40-10 today!
You'll find Catch-Alls available in progressive sizes from 3 to 192 Cu. In. in flare or sweat connections.

SPORLAN VALVE COMPANY 7525 SUSSEX AVENUE ST. LOUIS 17, MO.

EXPORT DEPARTMENT 89 BROAD STREET NEW YORK 4, NEW YORK

One of a series appearing in **FORTUNE, NEWSWEEK, TIME, BUSINESS WEEK** *and leading architectural magazines.*

How to keep the Fountain of Youth from Aging...

fastidious

Lewin-Mathes Seamless Copper Tube and Pipe showers its benefits in a pure, steady stream on a little girl. And decades later, it will show equal regard for her grandchild.

Through the years, the Lewin-Mathes installation performs like new without maintenance because—as Copper Tube *Specialists*—we build Copper's resistance to everything except flow. Lewin-Mathes' fastidious-minded inspectors — at every operation throughout our *completely integrated plant*—demand shiny smooth surfaces *inside* as well as outside our products.

When installing piping materials, be sure that your *first* cost is your *last* cost. Ask your architect, designer or engineer to specify Lewin-Mathes.

LEWIN (M) MATHES

SAINT LOUIS, MISSOURI

MANUFACTURERS OF
COPPER AND BRASS TUBE, PIPE AND ROD

THE GREATEST

The new Quiet-Tested Roof Exhauster design carries out the same graceful low contour lines so popular in all Jenn-Air Aluminum Exhausters. U-Spring Cushion Suspension Mounting eliminates the transmission of vibration and motor hum to the base of the unit, thus achieving a quietness never before possible. Patents pending.

"Ratings in accordance with standard test code by the Texas Experiment Station"—determined in accordance with procedures as set forth by NAFM and ASH&VE.

A graphic portrayal of what U-Spring Cushion Suspension Mounting can do in eliminating vibration. Note the silver coin standing on the base of the Unit. There is absolutely no evidence of vibration transmission.

ENGINEERING ADVANCE IN POWER EXHAUSTERS SINCE LOW CONTOUR DESIGN

NEW JENN-AIR

Quiet-tested

ROOF EXHAUSTER

WITH U-SPRING CUSHION SUSPENSION MOUNTING

Here's a new "hush-hush" product that *isn't* being guarded against discovery . . . in fact, Jenn-Air unwraps its exclusive Quiet-Tested Roof Exhauster for all to see . . . *NOW*. It is hailed as the most significant engineering advance in power exhausters since low contour design—a Jenn-Air First. Now, for the first time, a power exhauster is offered that's truly quiet.

U-SPRING CUSHION SUSPENSION MOUNTING CUTS VIBRATION—LOWERS NOISE LEVEL

A new principle of power assembly mounting is introduced in this new Jenn-Air Exhauster. U-springs suspend the power unit so it is cushioned against vibration . . . an exclusive Jenn-Air feature. New design in fan blade and housing reduces air velocity. In addition to the usual dynamic and static blade balance, a further critical test is made . . . the motor and blade are balanced together . . . another Jenn-Air exclusive. *All this adds up to the lowest noise level ever achieved in power exhausters.*

EVERY QUIET-TESTED EXHAUSTER INDIVIDUALLY CHECKED BY EXCLUSIVE VIBRONIC EYE

Every Quiet-Tested Unit is individually checked under simulated operating conditions by the exclusive Vibronic Eye in a sound controlled room. It works this way. First, a standard of acceptable quietness is established . . . then the Vibronic Eye tests every exhauster for vibration and noise. A further test is made for motor load and insulation break-down. Those are examples of the ceaseless search to improve products by Jenn-Air. So, look to Jenn-Air for better engineered exhausters —designed and line tested to perform beyond any in the field.

JENN-AIR PRODUCTS COMPANY, INC.
1102 Stadium Drive
Indianapolis 7, Indiana

Jenn-Air Exhausters on production line moving up for testing. Every Unit is line-lab tested for vibration, sound, motor load and insulation break-down before leaving the plant.

Here is the Vibronic Eye test chamber along the production line. Through the window is shown a Quiet-Tested Exhauster which has just moved into position for testing. This final check eliminates the element of human error.

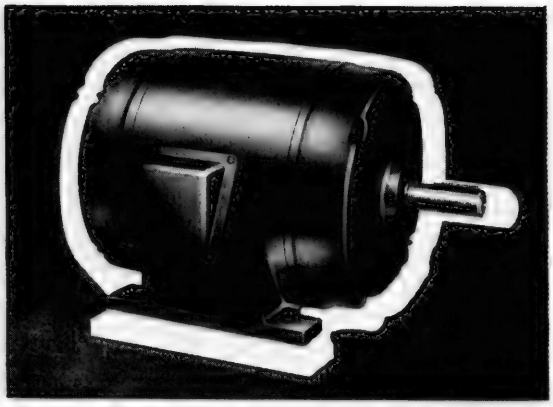
Wagner®
ELECTRIC MOTORS
... the choice of leaders in industry

You get better performance with these Wagner DP Motors

Wagner DP motors are *doubly protected* by (1) rugged, corrosion-resistant cast iron frames, smoothly rounded so that no moisture can collect on them. Motor feet are cast as an integral part of the frame for maximum strength and rigidity. (2) Enclosures on the DP motor are completely drip-proof—virtually splashproof. Air intakes are located at the bottom of the endplates and air outlets are located at the base of the frame—one on each side.

Although engineered to meet the re-rated NEMA specifications which call for more power in smaller frames, the same high quality and long life performance that have made Wagner Motors "the choice of leaders in industry" for many years has of course been retained.

Full information and principal dimensions are given in Bulletin MU-202. Write for your copy today.



MORE POWER IN SMALLER FRAMES The Wagner DP Motor packs more power in a smaller frame and this smaller size means ease of handling and stocking ... less space required for installation.

CAN BE RE-GREASED FOR LONGER LIFE This motor will operate for years without regreasing ... bearings are completely enclosed ... however, provisions have been made for adding lubricant and for the removal of old grease in cases where re-greasing is necessary.

COOL RUNNING Specially designed baffles direct cooling air from the blowers through the motor and provide protection for the stator windings. Blowers are an integral part of rotor ... and move large volumes of air without noise or vibration.

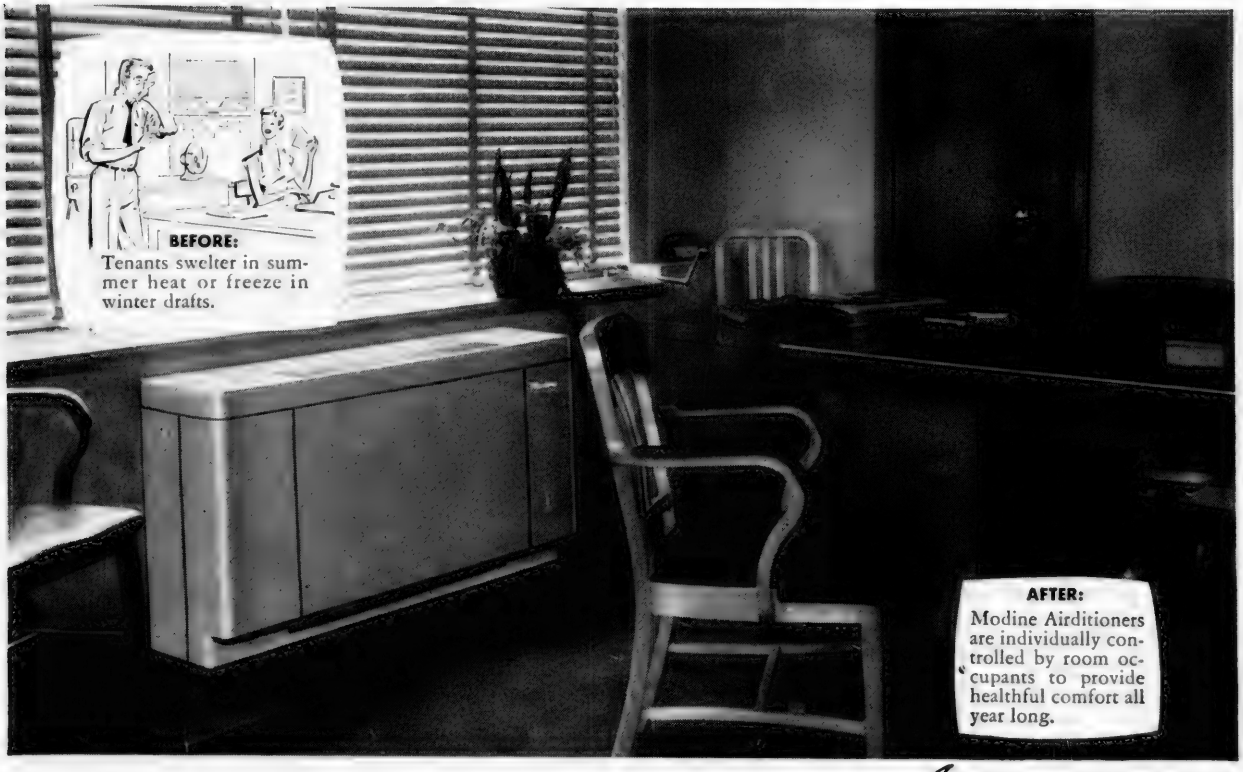
Wagner Electric Corporation
6463 Plymouth Ave., St. Louis 14, Mo., U. S. A.

BRANCHES AND DISTRIBUTORS IN ALL PRINCIPAL CITIES

M56-4

ELECTRIC MOTORS • TRANSFORMERS • INDUSTRIAL BRAKES • AUTOMOTIVE BRAKE SYSTEMS–AIR AND HYDRAULIC

Air conditioning existing buildings may be easier than you think...


BEFORE:
Tenants swelter in summer heat or freeze in winter drafts.
AFTER:
Modine Airditioners are individually controlled by room occupants to provide healthful comfort all year long.

It's as simple as this, with Modine Airditioners*

1. Individual units replace radiators in each room to be air conditioned. Hot water from your present boiler is piped to each unit for heating. Cold water from a central chiller is supplied through the same piping for summer cooling. A small motor (1/30 to 1/12 hp) operates two quiet fans in each AIRditioner to provide refreshingly cooled or heated air circulation. There are no expensive ducts to install. Here is low-cost, year-round comfort for new or existing office and apartment buildings, hotels or motels, hospitals or homes.

2. Operating flexibility cuts costs. With Modine AIRditioners, room occupants control their own temperatures. Units are operated only when and where they are needed. No need to air condition an entire building to provide comfort only in occupied rooms.

3. Types and sizes for every application. AIRditioners are offered in console (illustrated), concealed, built-in overhead and exposed ceiling models . . . in sizes to meet your remodeling or new construction requirements. All units are furnished with quiet, slow-speed motors (1050 rpm top speed) having built-in thermal overload protection as a standard safety feature.

*Trademark

Want to know more?

Consult the classified section of the phone book for your Modine representative. Contact him or mail the handy coupon for illustrated booklet.

MODINE MFG. CO.
1511 DeKoven Avenue, Racine, Wisconsin

Gentlemen: Please send me a free copy of Bulletin 745-D, describing Modine AIRditioners.

Name .....
Firm .....
Address .....
City .....Zone .....State .....

A-1283

Pipe for your next job in a jiffy!

7 Points of uniform goodness in YOUNGSTOWN PIPE

- uniform ductility
- uniform lengths
- uniform threading
- uniform weldability
- uniform wall thickness and size
- uniform strength and toughness
- uniform roundness and straightness

●You get quick service when you order steel pipe from your Youngstown Distributor. His complete stock and speedy delivery assure your getting pipe **on time.** No need for you to carry excess pipe inventory—or put up with costly job delays because of lack of pipe; just 'phone your nearby Youngstown Distributor.

Youngstown

QUALITY YOUNGSTOWN SERVICE

THE YOUNGSTOWN SHEET AND TUBE COMPANY

Manufacturers of Carbon, Alloy and Yoloy Steel

General Offices: Youngstown, Ohio - District Sales Offices in Principal Cities

SHEETS - STRIP - PLATES - STANDARD PIPE - LINE PIPE - OIL COUNTRY TUBULAR GOODS - CONDUIT AND EMT - MECHANICAL TUBING - COLD FINISHED BARS - HOT ROLLED BARS - BAR SHAPES - WIRE - HOT ROLLED RODS - COKE TIN PLATE - ELECTROLYTIC TIN PLATE - RAILROAD TRACK SPIKES

Refinery proving ground confirms superiority of Triple-Zone Gilsulate for hot underground pipes

"...pipes looked absolutely new...insulating efficiency equal to or better than any other...cost of the GILSULATE *system has been appreciably lower."*

—R. W. AYER, Chief Engineer, Salt Lake Refining Company

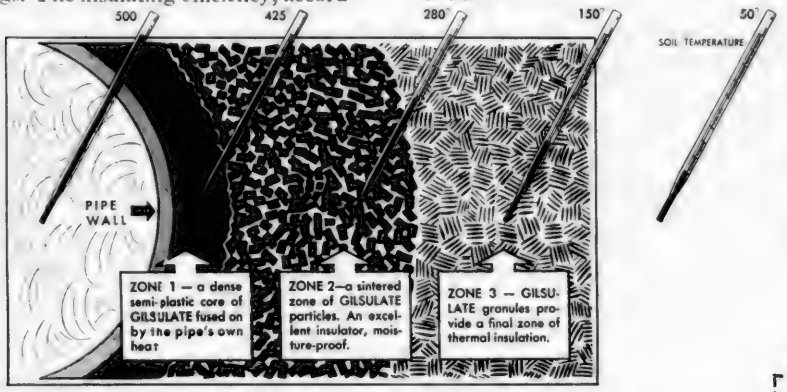
Salt Lake Refining Company confirms the findings of hundreds of GILSULATE® installations throughout the country: this *triple-zone insulation* succeeds where others have not fulfilled all operating conditions—*and at lowest cost per installed linear foot.*

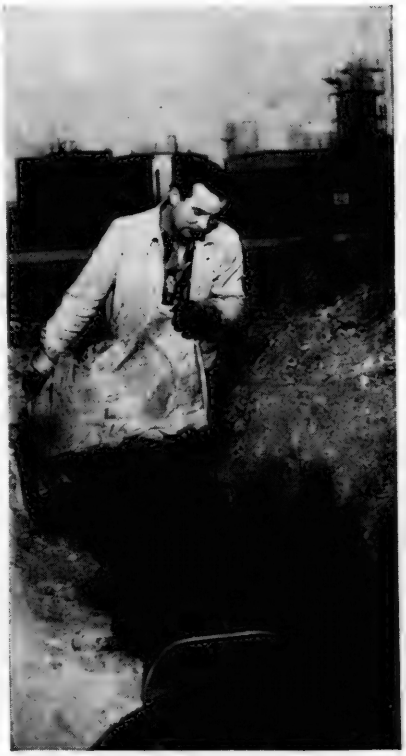
Research excavation of the initial GILSULATE installation at Salt Lake Refining Company, after 14 months of service, proved to their engineering and maintenance staff that this new insulation functioned at peak efficiency. Both lines—one of steam, one of water—were in excellent condition, with no evidence of pitting or scaling. Additional GILSULATE installations have been made since by the company for utility services and for road crossings. The insulating efficiency, according to their chief engineer, is "equal to or better" than any of the various other types of installations—and "at a cost that is appreciably lower."

Investigate the values of this easily installed, low-cost insulation yourself. Use the coupon below for complete information, or see your local GILSULATE distributor.

FACTS ABOUT GILSULATE

1. *Easy to use*—just pour, tamp and backfill... pipe heat does the rest.
2. *Forms 3 zones of protection* against heat loss and all commonly encountered hazards to hot buried pipes.
3. *Needs no* sleeves or mechanical sheaths: no mixing or special handling.
4. *Needs only* normal pipe spacing: for multiple pipe or cramped conditions.
5. *3 types* for varying temperature ranges up to 520° F.


500
425
280°
150°
50°
SOIL TEMPERATURE
PIPE WALL
ZONE 1 — a dense semi-plastic core of GILSULATE fused on by the pipe's own heat
ZONE 2—a sintered zone of GILSULATE particles. An excellent insulator, moisture-proof.
ZONE 3 — GILSULATE granules provide a final zone of thermal insulation.



Installing new GILSULATE *system is simply a matter of pouring (note metal forms to conserve material), tamping down...and backfilling.*

THE TRIPLE-ZONE INSULATION FOR LIFETIME PROTECTION OF HOT UNDERGROUND PIPES

GILSULATE®

AMERICAN GILSONITE COMPANY, SALT LAKE CITY 1, UTAH
Affiliate of Barber Oil Corp. & Standard Oil Co. of California

American Gilsonite Co.
134-A West Broadway, Salt Lake City, Utah
or
1145 East Jersey St., Elizabeth, N. J.

Send me more information on GILSULATE Insulation

NAME .....

TITLE .....

COMPANY .....

ADDRESS .....

AHV

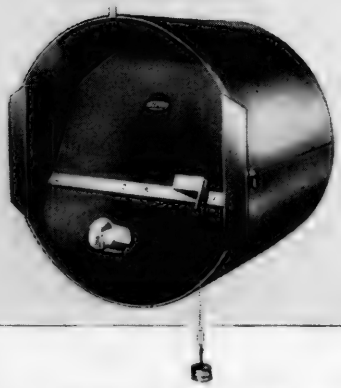
DEPENDABLE,

PRECISELY ACCURATE

Draft Control

for coal fired, oil fired, gas fired or gas-oil fired

HEATING PLANTS



FIELD TYPE "M" for coal and oil fired heating plants

Heavy duty commercial model in 28" and 32" sizes. Heavy, rigid construction assures long, trouble free service. Stainless steel knife edge bearing for permanent sensitivity. Also available in 6" through 24" sizes for domestic and commercial installations. First choice of heating men — the round control you can level on any flue.

FIELD TYPE "MG" for gas and gas-oil fired heating plants

A heavy duty, precision built control in sizes 8" through 32" for commercial and industrial installations. Stainless steel knife edge bearings for permanent sensitivity. Gate opens inward to regulate updrafts, and outward to relieve down-drafts. Optional safety switch available where codes require. Fully proven, accepted virtually everywhere.

They're real HEAVYWEIGHTS

Compare the weight of a Field Control to any other available. Here is proof of the massive, welded construction, long, vibration-free service, that permits Field's supreme accuracy.

Size Control	Gate	Thickness of Parts Side Plates	Ring	Collar	Wt. without Crtn. or Crate
14 M	16 Ga.	16 Ga.	3/16 x 2"	22 Ga. Galv.	19#
16 M&MG	16 Ga.	16 Ga.	3/16 x 2"	18 Ga. Galv.	28#
18 M	16 Ga.	16 Ga.	3/16 x 2"	18 Ga. Galv.	35#
20 M&MG	16 Ga.	16 Ga.	1/4 x 2"	18 Ga. Galv.	41#
24 M&MG	14 Ga.	16 Ga.	1/4 x 2"	18 Ga. Galv.	65#
28 M&MG	14 Ga.	14 Ga.	1/4 x 4"	14 Ga. H.R.S.	110#
32 M&MG	14 Ga.	14 Ga.	1/4 x 4"	14 Ga. H.R.S.	140#

field

FIELD CONTROL DIVISION

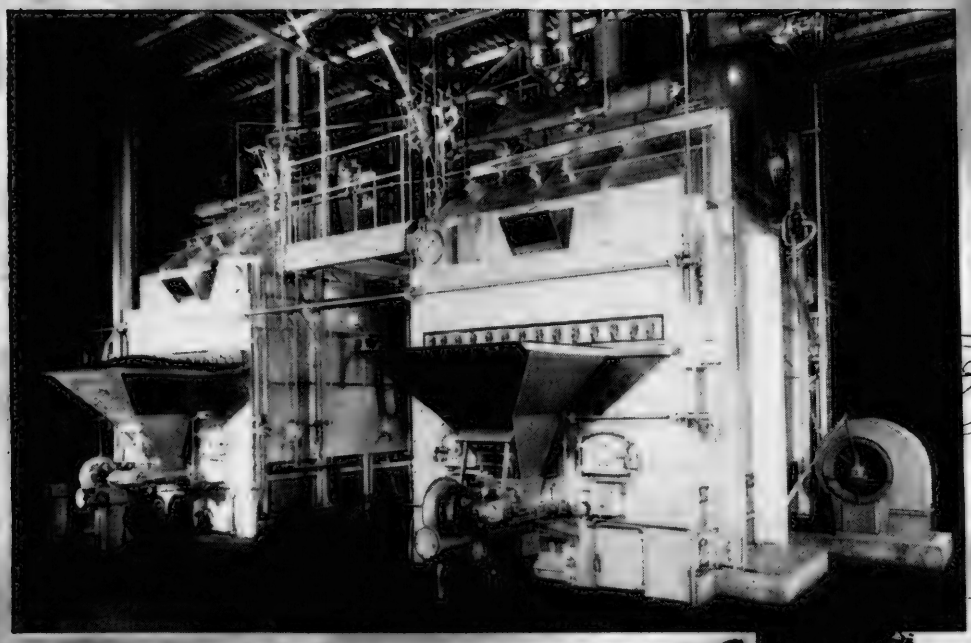
of H. D. CONKEY & COMPANY, Mendota, Ill.

Affiliates

Conco Building Products, Inc. • Brick, Tile, Stone
Conco Materials Handling Division • Cranes, Hoists

DETROIT STOKERS HELP REDUCE COST OF STEAM AT PINEHURST

The Detroit Stoker Equipped Steam Plant at this Famous North Carolina Resort Serves three Hotels, seven other buildings



Steam Plant, Pinehurst, Incorporated, showing Detroit Single Retort Stokers. Boilers are Babcock & Wilcox Integral Furnace Type FF.
John F. Taylor, *Manager Utilities* . . .
Wiley & Wilson, *Consulting Engineers*, Richmond, Va.

The Carolina Hotel, Pinehurst, N. C.— the largest of the three hotels served by this modern plant.

Cost of steam per thousand pounds has been reduced 28½% by the new stoker — boiler installation, according to Mr. John F. Taylor, Utilities Manager, Pinehurst, Incorporated, Pinehurst, N. C. Amount of steam generated per pound of coal has been increased 22%.

The stokers are Detroit Single Retort Underfeed motor driven . . . the boilers are B&W Integral Furnace Type FF. A master regulator is connected to the Detroit Adjustable Feed Control on each stoker and to the adjustable damper of each motor-driven fan to regulate fuel and air in proportion to the load.

Detroit Underfeed Stokers provide high efficiency at low operating cost with small and medium size boilers.

Write for Bulletins

DETROIT STOKER COMPANY

GENERAL MOTORS BLDG.—DETROIT 2, MICH.
DISTRICT OFFICES IN PRINCIPAL CITIES • WORKS AT MONROE, MICH.

DETROIT SINCE 1898 STOKERS

AGITAIR rectangular diffusers with one and two-way blow patterns installed in exposed duct.

for better air... remodel with AGITAIR®

The distinctive design of AGITAIR air diffusers and their exclusive performance characteristics make them ideally suited for remodelling jobs.

AGITAIR square and rectangular units with built-in diffusing vanes are custom made in unlimited air patterns to provide correct air distribution from any interior location.

AGITAIR STRIPLINE diffusers combine the best features of slots and efficient air diffusers. STRIPLINE is versatile, inconspicuous and practical. Available in sections or supplied as a continuous decorative unit, STRIPLINE meets any requirements of interior treatment or air flow.

Write for complete engineering data.

Type F *STRIPLINE*

STRIPLINE slot diffusers installed in light cove.

AIR DEVICES INC.

185 MADISON AVENUE, NEW YORK 16, N. Y.

air diffusers • filters • exhausters

New HARTZELL REVERSIBLE ROOF VENTILATOR

- does the work of two fans with no loss of efficiency
- 28", 36" and 44" fan diameters
- capacity range: for exhaust—6800 to 23,600 CFM; for intake—6520 to 22,300 CFM
- meets the most stringent requirements for a black-out type roof ventilator
- available in curb, peak or slope base construction
- rugged construction, 20 gauge galvanized steel (18 gauge base on 36" and 44" models)
- head swings back on hinges to provide easy access for motor maintenance

This ventilator can also be supplied with any standard or Lo-Noise Hartzell fan when air flow in only one direction is required.

Please send me a copy of Bulletin A-112-A giving complete specifications and dimensions on the new Hartzell Reversible Roof Ventilator.

Name _____

Title _____

Company _____

Street _____

City & State _____

HARTZELL *propeller fan co.*
Div. of Castle Hills Corp.

103 Herrman Ave., Piqua, Ohio

ENGINEERING OFFICES IN PRINCIPAL CITIES

PROPELLER FANS • BLOWERS • ROOF VENTILATORS • UNIT HEATERS

Fabulous 40 Million dollar Mid-America home of...

PRUDENTIAL

Equipped with Marsh Valves, Traps, Gauges

Architects and Engineers:
Naess & Murphy, Chicago
General Contractors:
George A. Fuller Co., Chicago
Heating Contractor:
H. P. Reger

Skyscraper among skyscrapers, the 40-million dollar Prudential Building stands 44 feet above Chicago's highest rooftop—a giant 400-foot-square edifice containing a million sq. ft. of office space, 30% of it is to be the new "Mid-America Home Office" of Prudential.

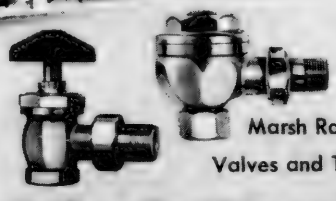
It is easy to see why Prudential is building this "Mid-America Home" for Illinois and Indiana when you hear that in the last year Prudential wrote more than 468 millions in policies and paid out 88 millions to beneficiaries in these two states alone. In Illinois and Indiana Prudential now has 4½ *billions* of insurance in force!

The great building is a city in itself . . . with a spectacular restaurant and observation floor at the top, year round air conditioning with personal control in individual offices, and ultra-modern features far too numerous to cover in limited space.

As in so many masterpieces of architecture and construction, Jas. P. Marsh Valves, Traps and Gauges are used exclusively wherever equipment of the Marsh type applies. On that next job see for yourself the dependable performance that has made Marsh heating specialties first choice in finest buildings.

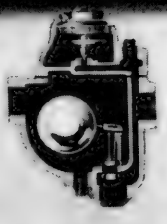
MARSH HEATING EQUIPMENT CO.
Sales affiliate of Jas. P. Marsh Corporation
Dept. U, Skokie, Ill.

Marsh Instrument & Valve Co.
(Canada) Ltd.,
8407 103rd St.,
Edmonton, Alberta



Marsh Radiator Valves and Traps

Marsh Pressure Gauges



Marsh F & T and Float Traps

MARSH *Heating Specialties since 1865*

Prudential "takes out insurance"

NEW... *Quiet, efficient, power-packed*

10 H.P. *Copelametic*

FOR... PACKAGED AIR CONDITIONING

There was plenty of interest in this 10 H.P. Copelametic when we introduced it at the ARI Show in Atlantic City. Many features make it ideal for quality, packaged air conditioning.

The 10 H.P. Copelametic motor-compressor fits neatly into a compactly designed unit. For greater capacity, two motor-compressors can be installed for flexibility in operation.

Use of suction cooling and Freon-22 give the 10 H.P. Copelametic high capacities with low power input. As in all time-proved Copelametics, belts, seals and manual oiling are eliminated. Being accessible, adjustments and parts replacement can be made on the spot with minimum loss of operating time.

Everything required in package air conditioning is featured in the 10 H.P. Copelametic. It is compact . . . rugged . . . efficient . . . quiet-running . . . accessible. It has the protection of positive lubrication.

A comprehensive, detailed engineering packet describing the 10 H.P. is available. SEND FOR YOURS.

SINCE 1918

Copeland REFRIGERATION CORPORATION, Sidney, Ohio

The most convincing stamp of user satisfaction

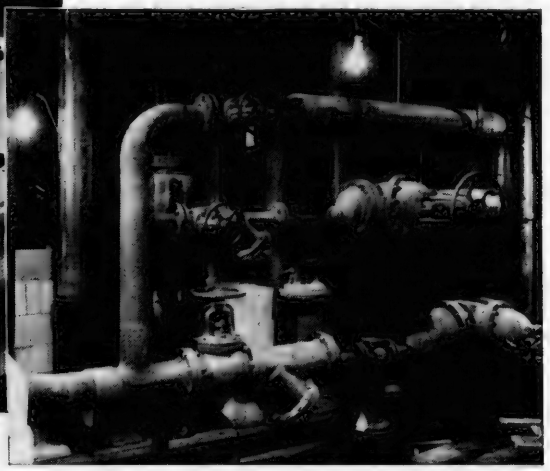
Prudential "takes out insurance" on safety and dependability with USS NATIONAL PIPE

The Prudential Insurance Company of America adopted the policy of installing nothing but the best in their new Chicago office building. That's why almost 200 tons of National Steel Pipe were used in the construction of the ultra-modern skyscraper. Here's how the material was used:

- Approximately 120 tons of National Seamless, ranging in diameter from 6 inches to 20 inches, were employed as air conditioning carriers. These "risers" run from the sub-basement to the top floors.
- About 42 tons of National Seamless, ranging from 2 inches to 14 inches in diameter were used for heating and fan rooms.
- About 20 tons of National Pipe, from 1 inch to 3 inches in diameter, help make up the building's plumbing system.

It's no surprise that National Pipe is used in so many of the "big jobs" across the country. Engineers know from past experience that they can depend on National for safe, efficient, trouble-free service.

Write us for further information on the use of National Pipe in air conditioning, heating, and power installations. And, if you'd like some personal assistance with your pipe problems, get in touch with our engineers.



Prudential Building, Chicago, Illinois
ARCHITECT AND ENGINEER: Naess and Murphy, Chicago
GENERAL CONTRACTOR: George A. Fuller Co., Chicago

NATIONAL TUBE DIVISION, UNITED STATES STEEL CORPORATION, PITTSBURGH, PA.
COLUMBIA-GENEVA STEEL DIVISION, SAN FRANCISCO, PACIFIC COAST DISTRIBUTORS
UNITED STATES STEEL EXPORT COMPANY, NEW YORK

NATIONAL PIPE

USS

UNITED STATES STEEL

The most convincing stamp of user satisfaction

9 repeat orders for Sarco Heating Specialties

Engine factory of Caterpillar Tractor Co., Peoria, Ill. *Architects & Engineers:* Giffels & Vallet Inc., L. Rossetti Assoc., Detroit. *Heating Contractor:* The Stanley-Carter Co., Detroit.
Sarco heating specialties also are providing trouble-free service in Caterpillar's Joliet and Decatur, Ill. and York, Pa. plants.

...won by past performance at Caterpillar Tractor Co.!

SARCO heating specialties were first installed in a Caterpillar plant back in 1947.

Since that first order, Sarco heating specialties have been ordered an *additional nine times* for four Caterpillar plants—each repeat order is indicative of the confidence Caterpillar has in Sarco performance.

Today, more than 1800 Sarco steam traps in addition to other heating specialties give trouble-free service at four Caterpillar Tractor Co. plants.

Architects, engineers and heating contractors appreciate this kind of dependability. It assures them complete user satisfaction, protects reputations, eliminates trouble-some call-backs. Why not specify Sarco on *your* next job?

For full information on all Sarco products, write Sarco Co., Inc., Empire State Bldg., New York 1.

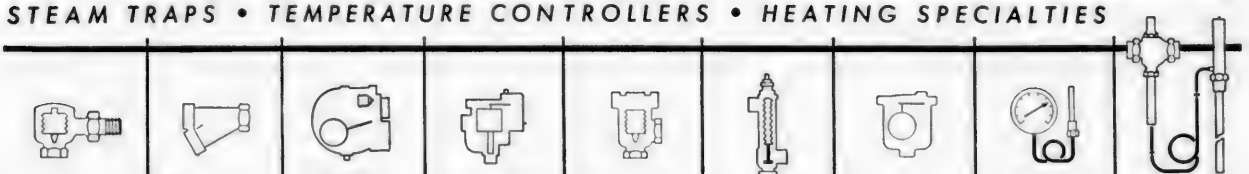
America's Industrial Leaders Repeatedly Order Sarco Heating Specialties

Aluminum Co. of America
Bethlehem Steel Co.
Caterpillar Tractor Co.
Ford Motor Company
Lederle Laboratories (Div. of American Cyanamid Co.)
United Aircraft Corporation
U. S. Steel Company
Western Electric Company

2102-B

SARCO *saves steam*

STEAM TRAPS • TEMPERATURE CONTROLLERS • HEATING SPECIALTIES



Radiator Valves • Traps | Strainers | Float-Thermostatic Traps | Camlift Bucket Steam Traps | Thermostatic Traps | Water Blenders | Air Eliminators | Dial Thermometers | Self-Operated Temp. Reg.

All season sensation!

NEW **Mueller Climatrol** recessed room air conditioner

HEATS
with steam or hot water in commercial and institutional buildings.

COOLS
with its own air-cooled, one-hp refrigeration cycle.

SAVES
up to 50% on installation . . . 20% on operating costs.

EVERY room with its own thermostat-controlled heating-cooling system! New Mueller Climatrol recessed air conditioner is compact, attractive, conceals ugly piping . . . heats, cools and dehumidifies . . . ventilates with fresh outdoor air . . . exhausts stale air. Windows can be kept locked and sealed, preventing entrance of "downtown dirt."

No water — a boon in areas where water cannot be used for air conditioning. Efficient one-hp refrigeration cycle is air-cooled . . . requires no plumbing or drainage.

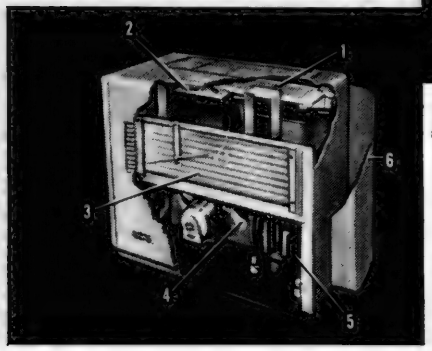
Of course, you'll want full details. Write Mueller Climatrol, Dept. 36, 2060 W. Oklahoma Ave., Milwaukee 15, Wisconsin.

Mueller Climatrol

compact inside

. . . flush outside

. . . quality-built throughout



1. Hot water or steam coil provides even heat, gently circulated by big-twin centrifugal blowers for perfect comfort.

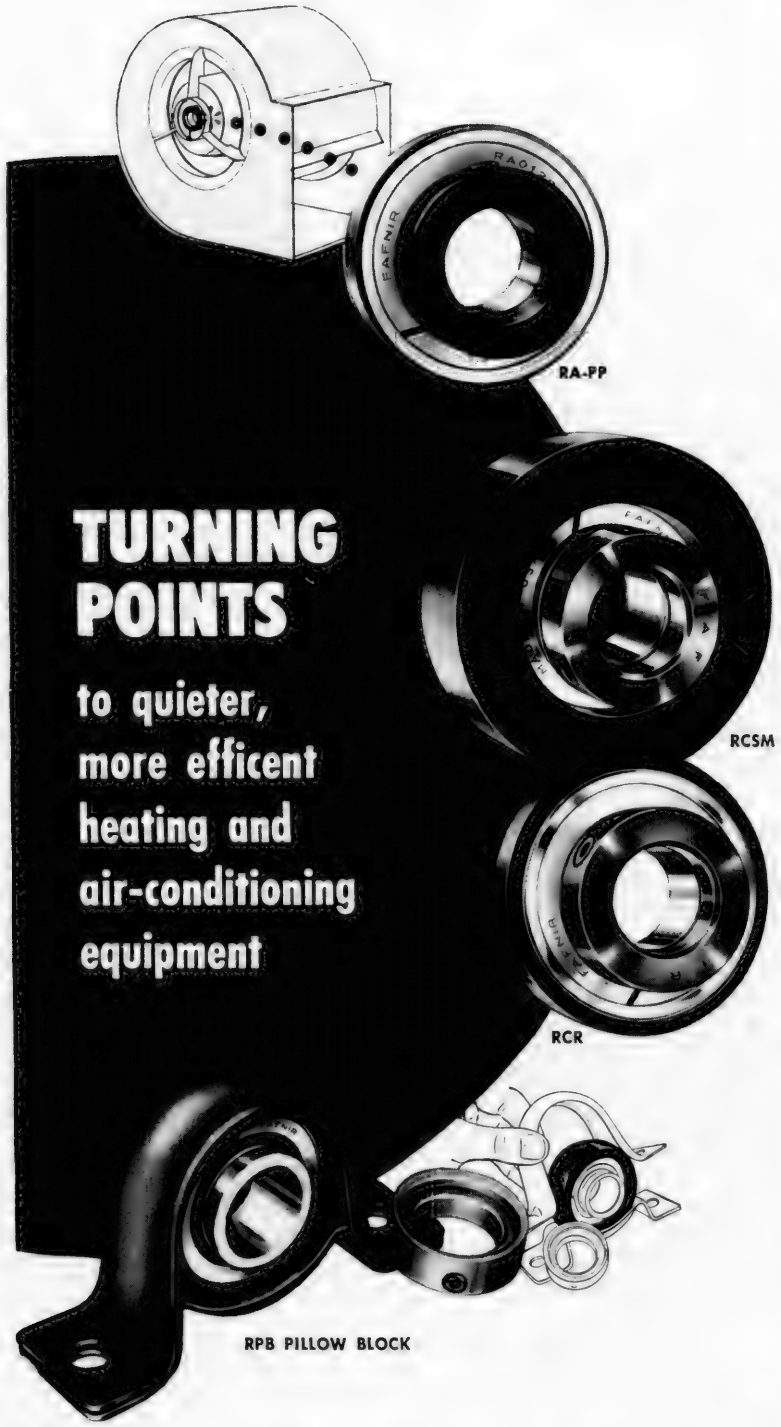
2. Individual room temperature control is easy with push-button selector. Heating-cooling thermostat provides uniform comfort.

3. Full-width cooling coil has extra capacity for even air distribution, ample dehumidification.

4. Propeller fan exhausts heat from condenser coil and dissipates condensate . . . can be used to exhaust stale room air.

5. Entire one-hp refrigeration cycle mounted on easy-to-remove frame. No need to disturb heating coils or piping to remove cycle for service.

6. Chases completely conceal supply and return pipes, valves, etc.; make attractive installation.



TURNING POINTS

to quieter, more efficent heating and air-conditioning equipment

NEW SUPER-QUIET BALL BEARING SERIES

The RA-PP Ball Bearing Series, recent addition to the Fafnir Line, is specifically designed to take the place of ordinary sleeve bearings on equipment where quiet operation is of primary importance. Its construction features include:

1. *balls and races specially finished for super-quiet performance*
2. *sizes that fit popular bearing brackets using sleeve bearings*
3. *extended inner ring for greater shaft support*
4. *self-locking collar for easiest assembly . . . securely locks bearing to shaft with twist of wrist*
5. *patented removable Plya-Seals that positively keep dirt out, lubricant in*
6. *pre-lubricated with correct amount of long-life, factory-filtered grease. No relubrication needed.*

NEW RUBBER CYLINDRICAL CARTRIDGES

RCSM TYPE . . . specifically designed to be interchanged with other makes of ball bearing rubber-cushioned cartridges. Features new type super-quiet Fafnir Ball Bearing plus specially-developed electric current-conducting rubber cartridge.

RCR TYPE . . . specifically designed for interchanging with sleeve bearing mountings. Also features new type of super-quiet Fafnir Ball Bearing and specially-developed rubber cartridge.

NEW RPB TYPE RUBBER-CUSHIONED PILLOW BLOCK

A completely packaged low-cost ball bearing unit with engineered "super-quiet" construction, the RPB features (1) the new Fafnir super-quiet ball bearing, (2) a thick, electric-current-conducting rubber interliner, (3) compact, lightweight, two-piece pressed steel housing, (4) famous Fafnir self-locking collar making unit easiest of all to install, (5) patented Plya-Seals that retain prepacked lubricant for life and keep out contaminants.

PLUS . . . a complete line of ball bearings with other types of rubber housings. **SEND FOR NEW BULLETIN,** The Fafnir Bearing Company, New Britain, Conn.

FAFNIR

BALL BEARINGS

MOST COMPLETE LINE IN AMERICA

Guaranteed TO SHUT TIGHT*

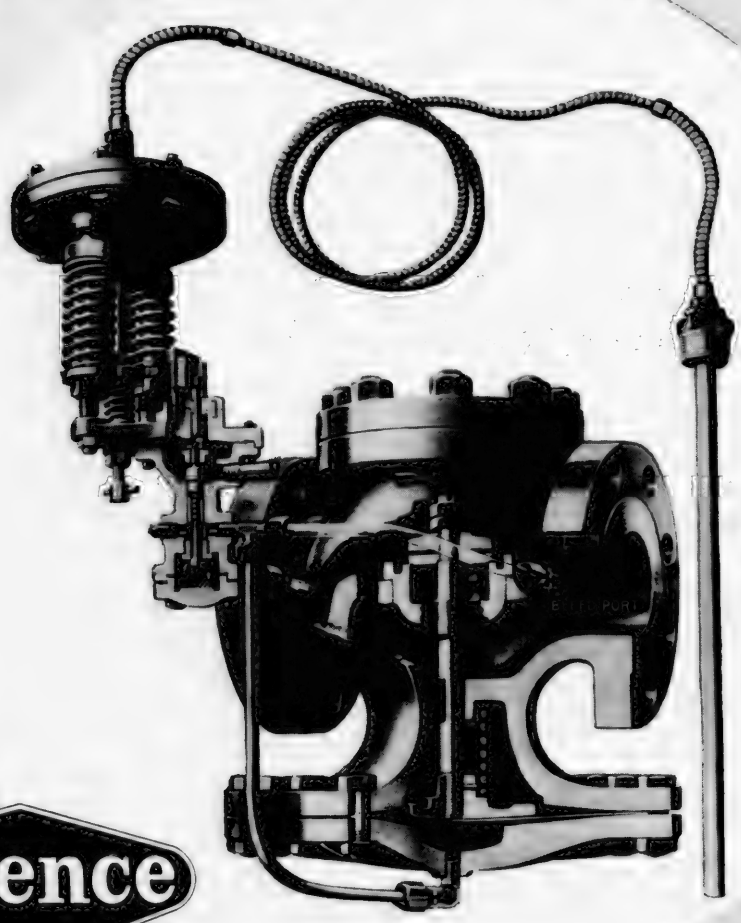
*When equipped with a SECO Metal Seat and Disc on steam service and protected by an approved Strainer, a Spence Regulator is guaranteed to shut tight when the demand for steam ceases.

Expensive steam leaks due to a lack of absolutely tight shutoff are eliminated in Spence Temperature Regulators. Here is why we can make such a guarantee:

First, our temperature regulators are of the single seat design. Seats and discs are made of durable SECO Metal. More than 20 years experience in thousands of installations has failed to produce a single case where SECO Metal has been cut by steam.

These plus other design features explain why Spence Temperature Regulators function dependably and accurately year after year without requiring expensive repairs or special attention.

Want more facts? Write for Bulletin T50 giving full details.



SPENCE
TYPE ET150
Temperature
Regulator

Spence

SPENCE ENGINEERING COMPANY, INC.
WALDEN, NEW YORK

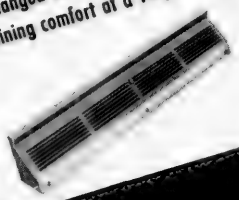
...condensed consumer reports from the files of

standard

registers and grilles

B-24 PERIMETER BASEBOARD DIFFUSERS

Mad Maud used to fume
When air blasts blew her from the room,
But B-24 changed her wrath to revel,
By maintaining comfort at a very high level!

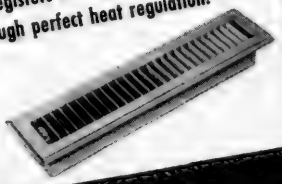


PERIMETER BASEBOARD REGISTER NO. 551

Frozen Frank was in a snit;
found cold corners wherever he'd sit.
But with the 551's four way diffusion,
He now has comfort in profusion!

PH SERIES PERIMETER FLOOR REGISTERS

When Circle Sal entertained the ladies,
They found her home as hot as hades.
PH Registers restored her station,
Through perfect heat regulation!



CEILING AIR DIFFUSERS

Sinus Sam was a martyr true;
Stuffy air turned him blue,
'Til he put Ceiling Air Diffusers in.
Now he's in the pink again!

MORAL: If you want to keep your customers happy mail this coupon and make it snappy!

STANDARD

...first in engineering for indoor comfort

STANDARD STAMPING & PERFORATING CO.
3141 W. 49th Place, Chicago 32, Illinois

Gentlemen: Please send me your new catalog showing the complete line of STANDARD STAMPING REGISTERS AND GRILLES.

Name_____

Company_____

Address_____

City_____ Zone_____ State_____

There's **MORE** rating selection available in Allis-Chalmers **MOTORS**

To meet your needs...

Allis-Chalmers Offers Complete Line of Rib-Type MOTORS from 1 to 100 Hp

Allis-Chalmers, a pioneer in rib-type TEFC motor design, is the only leading manufacturer offering a complete line of these motors from 1 to 100 hp. The many cost-saving features of deep-rib construction can be applied in a variety of uses . . . both indoors and out.

Here's why these motors can cut service costs:

MORE cooling surface — Rib-type design provides reserve cooling capacity in dirty locations.

MORE iron—Cast-iron frame and external parts assure rigidity and resistance to corrosion.

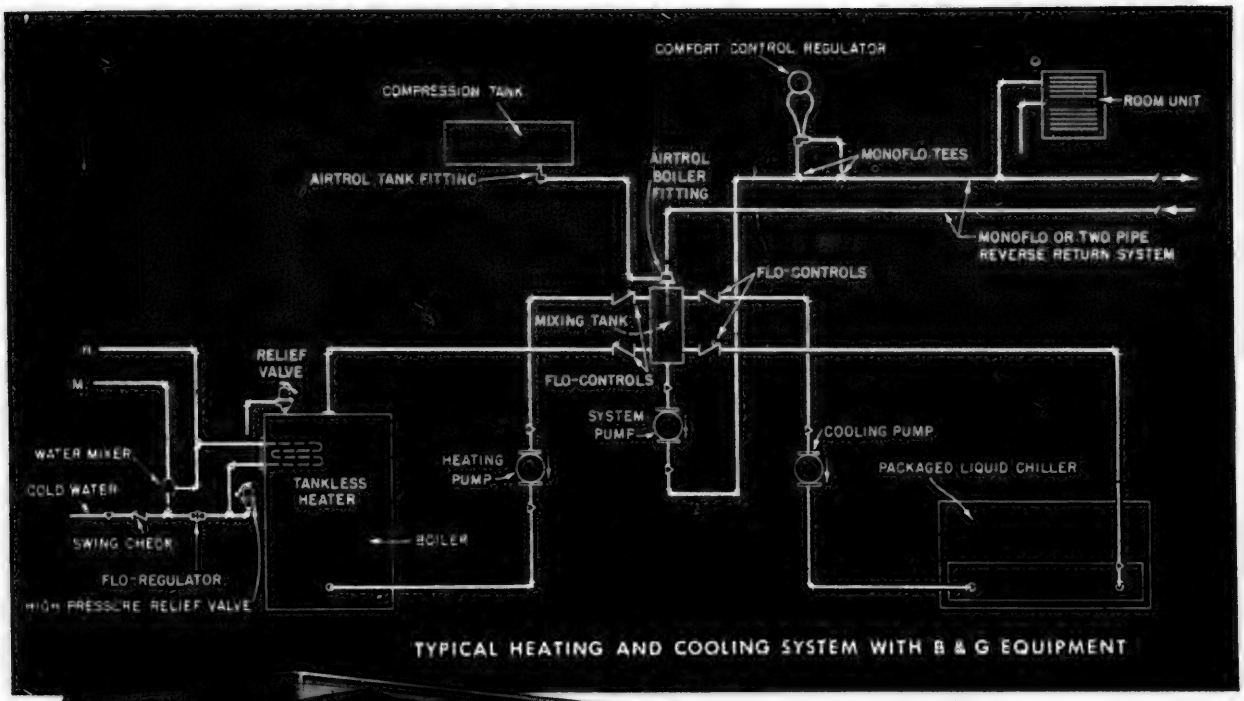
MORE copper — Allis-Chalmers greater use of copper increases electrical life.

MORE lubrication provisions — Large grease reservoirs surround bearings. Provision made for in-service relubrication — important where moisture or corrosive vapors contaminate grease.

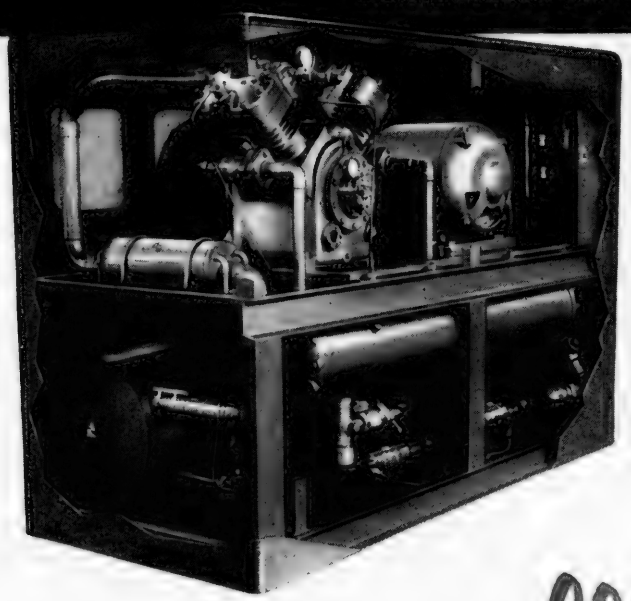
As a new machinery component or as replacement, specify Allis-Chalmers. To find out more, contact your nearby Allis-Chalmers distributor, district office, or write Allis-Chalmers, General Products Division, Milwaukee 1, Wisconsin.

A-4943

ALLIS-CHALMERS



TYPICAL HEATING AND COOLING SYSTEM WITH B & G EQUIPMENT



VIRTUALLY A PLUG-IN UNIT...
7½ TO 100 TONS CAPACITY

The B&G Package Liquid Cooler offers an impressive array of features for more efficient performance and easier installation. For example, the low pressure drop through the evaporator permits a substantial reduction in system pump sizes. The evaporator is under the compressor, for a lower center of gravity, easier installation and service. Pump-down is non-recycling...and an integrated electrical control system provides a high degree of automation without extra cost. Wiring is complete, including that of the chiller and tower pump.

This is a B&G Product...built to the high standards which make the B&G label a warranty of satisfaction.

A COMPLETE *cooling package*

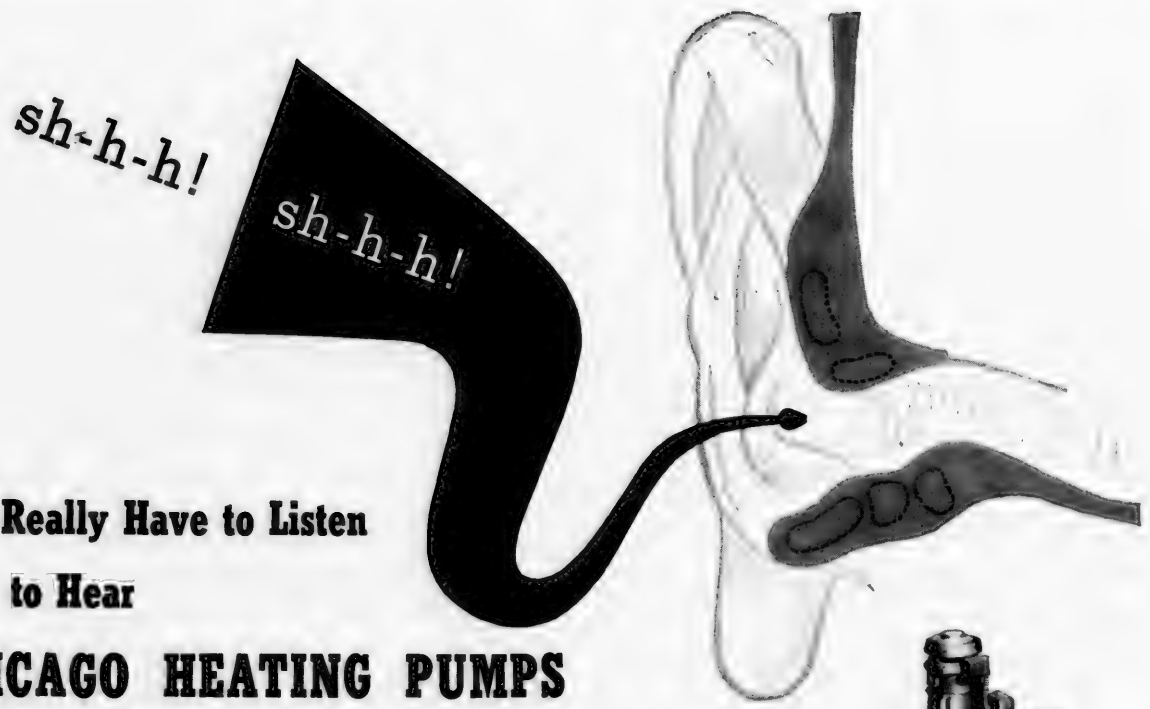
Stock pumps and cooling components for immediate shipment

No need now for delays on the job because of missing material. For your convenience, a stock of most commonly used sizes of refrigeration and air conditioning components is maintained at the B&G factory for immediate delivery. These units include Centrifugal Pumps, Condensers, Liquid Receivers and Heat Exchangers. Just write, phone or wire!

Send today for a complete file of B&G literature on factory stock items.

For complete data on the B&G Package Liquid Cooler, ask for Catalog HB-*755*.

BELL & GOSSETT
COMPANY
Dept. REG-4, Morton Grove, Illinois
Canadian Licensee: S. A. Armstrong, Ltd., 1400 O'Connor Drive, W. Toronto



You Really Have to Listen to Hear CHICAGO HEATING PUMPS

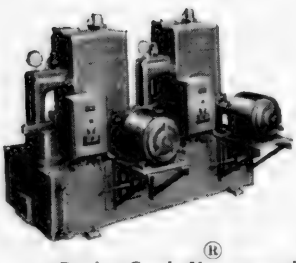
Quality Makes Them Quiet

In a heating pump, silence—or near silence is golden. It tells you, first of all, that here is a precision-made pump that will "pay off" through years of service . . . with least maintenance and continuous high performance. And quiet operation of a heating pump means quieter operation of the entire heating system.

A Size for Every Job

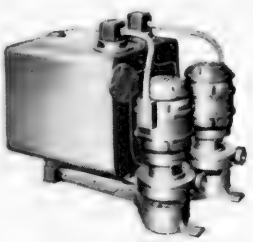
There are Chicago Heating Pumps for every type of heating job. This means you can get a Chicago Pump that exactly fits your requirements — in capacity, pressure, and equivalent direction radiation ratings. You don't have to accept a substitute that may labor at heavy loads and then need excessive maintenance to keep it in service. Specify Chicago Pumps and be sure of quiet, efficient pumping — always. Write to Department C for descriptive literature.

Type AVC condensation pump & receiver for 5,000 to 10,000 EDR and 10 to 30 psi. Write for Bulletin 245.

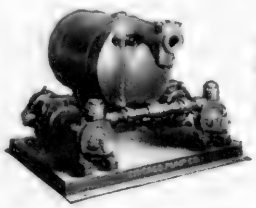


Duplex Condo-Vac® return line vacuum and boiler feed pump for vacuum systems at pressures to 40 psi, 2,500 to 150,000 EDR. Described in Bulletin 270.

Type CLL1 vertical condensation pump & receiver for low returns. 1,000 to 40,000 EDR and 10 to 52 psi. Bulletin 255.



Sure Return® condensation pump and receiver. Will not steam bind. For low and medium pressure systems to 75,000 EDR. Described in Bulletin 250.



Duplex FC condensation unit for capacities up to 50,000 EDR and 150 psi. Described in Bulletin 260.

CHICAGO PUMP COMPANY
Subsidiary of Food Machinery and Chemical Corporation
BUILDING PUMP DIVISION
622 DIVERSEY PARKWAY • CHICAGO 14, ILLINOIS

Condo-Vac®, Sure Return®, AVC, LVC, Fire, House & Circulating Pumps, Pneumatic & Tankless Water Systems . . . Flush Kleen® Sewage Ejectors, Little Giant® & Non-Clog Bilge Pumps. Pumps for every industrial use.

Fits like a glove

PETRO firing unit with everything built in, balanced and factory tested

Phantomed area shows the Petro package unit (assembled at factory on its own base) fitted to boiler front. Refractory burner throat is part of the burner—no brick work or tile required.

The PETRO package includes an oil or gas burner *(or combined gas-oil)*; a factory-wired control panel; forced draft air supply and a built-in fuel system—ALL IN A SINGLE INTEGRATED UNIT

This is not a simple conversion burner—it's a complete combustion system. Everything that goes into an ultra-modern firing system is right here, mounted on a rigid steel frame and ready to go. All of the intricate wiring and electrical controls are factory assembled, installed, and tested. Every component is engineered for the job, in the proper size, capacity, and type. Nothing is left to on-the-job improvising.

And best of all from *your* standpoint, a single unit means single responsibility. It's a Petro job from beginning to end and Petro is proud to back it up. It has all the sturdy qualities that have made Petro famous for DEPENDABILITY.

The Petro forced draft burner is suitable for firing all types of boilers, or can be purchased as a complete boiler-burner unit with matched Scotch type Titusville or Kewanee boiler.

Coupon will bring full information and specifications.

PETRO

T.M. REG. U.S. PAT. OFF.

PETRO, 3221 West 106th Street, Cleveland 11, Ohio.
In Canada, 2231 Bloor Street West, Toronto, Ontario.

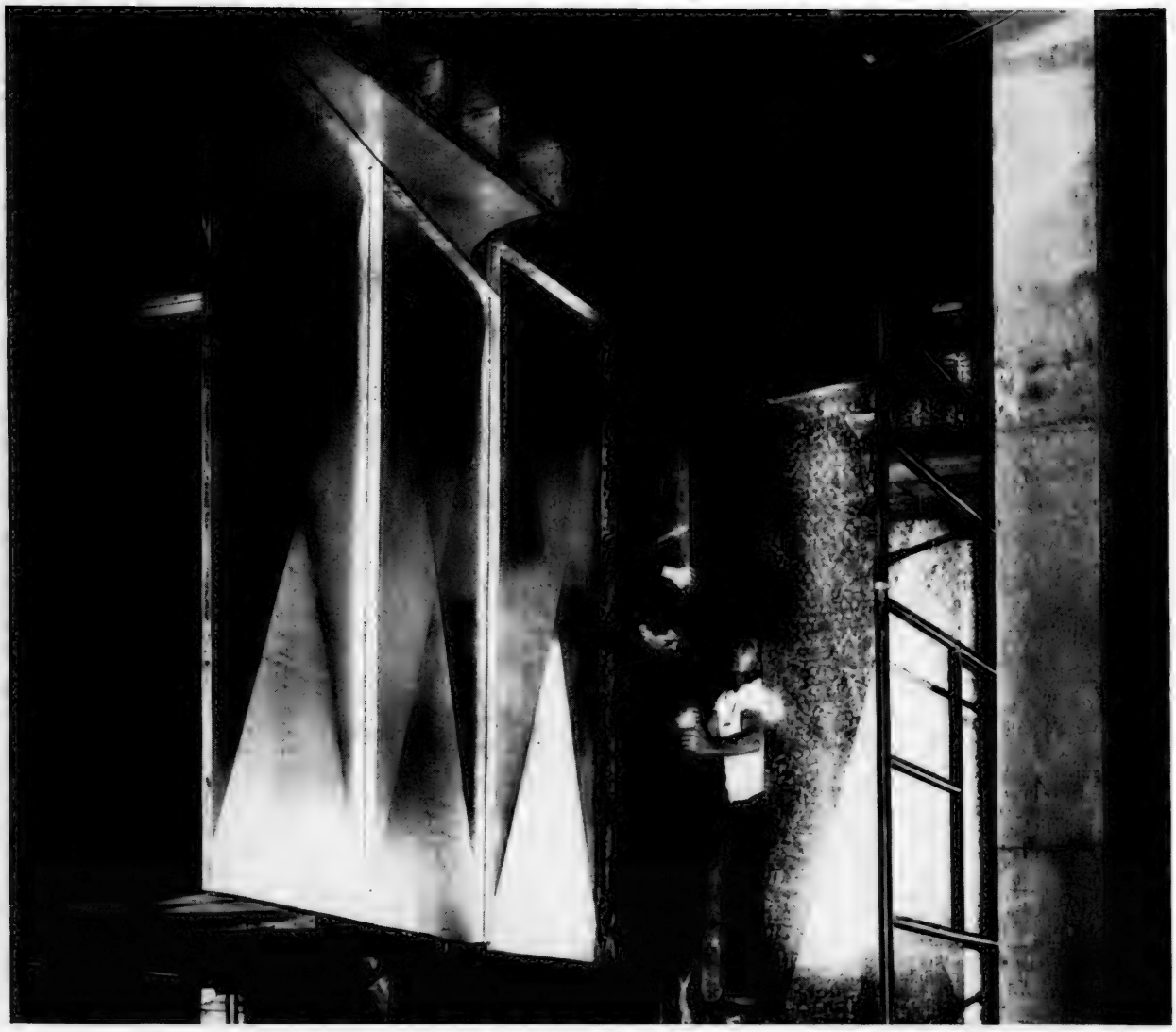
Please send me literature and specification sheets on the money-saving Petro Package Unit.

Name _____

Company _____

Address _____

City _____ State _____



Bethcon is better to work, better to look at

Sheet-metal jobs like this one are being made better these days with Bethcon, product of Bethlehem's continuous galvanizing lines. One of the chief advantages of continuous galvanizing is the superior bond between zinc coating and base metal, which permits severe forming without damage to the galvanized finish. You can actually bend Bethcon double without cracking or peeling of the zinc.

Another "plus" is the improved appearance and sales appeal of the finished product. Continuous galvanizing gives Bethcon brighter, more uniform spangles. It also distributes the zinc more evenly over the sheet, eliminating the heavy beads usually found on the drip ends of galvanized sheets.

You can specify Bethcon in cut sheets or coiled lengths, 16-gage or lighter. You can also choose between plain and corrosion-resisting copper-bearing steel for the base metal, depending on your requirements. Any additional information you would like to have about Bethcon will be gladly furnished by the Bethlehem sales office nearest you.

BETHLEHEM STEEL COMPANY, BETHLEHEM, PA.

On the Pacific Coast Bethlehem products are sold by Bethlehem Pacific Coast Steel Corporation. *Export Distributor:* Bethlehem Steel Export Corporation

BETHLEHEM STEEL

BETHLEHEM STEEL

The Welding of Two Reputable Names

(Long Famous for Quality and Service)

into

A NEW SYMBOL

of modern efficiency in heating and air conditioning equipment which means:

a complete line under one brand name

ready acceptance and faster, profitable turnover

easy installation with dependable results

and to the consumer:
more healthful, comfortable living

HEATING AND AIR CONDITIONING PRODUCTS

National-U.S. Radiator
CORPORATION

FOR MORE HEALTHFUL - COMFORTABLE LIVING

National-U.S. Radiator

CORPORATION

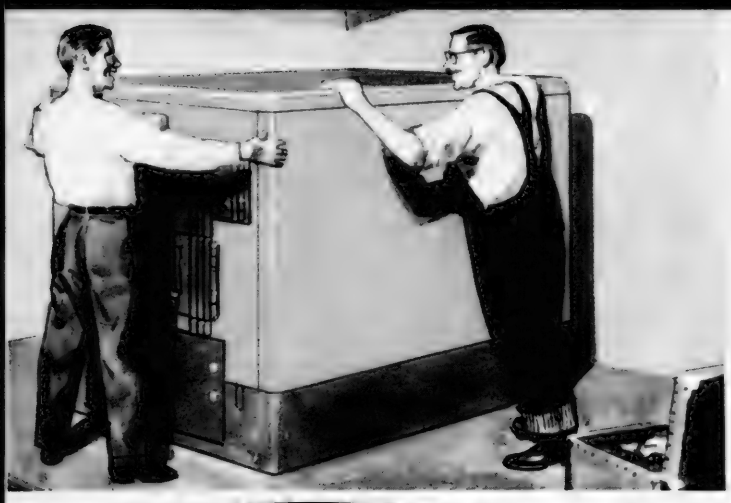
This new name originated by the joining together of two famous long established companies in the heating field, recognized for high standards of quality and service, marks a new milestone of progress in the heating and air conditioning industry.

- It brings together two top-flight engineering organizations for development and research. It unites the manufacturing abilities and know-how of two leading companies, each with over a half century of production experience in heating products.
- It offers the newest and most complete line of heating and air conditioning equipment in the world

What this means to YOU

to: Wholesalers

- A completely integrated full line of modern hot water and steam heating products and air conditioning equipment.
- All equipment and accessories may be purchased and selected from *one source.*
- Minimum investment required because stocking is simplified.
- A line that is easier to sell—with faster turnover and better profit—due to dealer acceptance and demand.



to: Dealers

- Hot water and steam heating and air conditioning products designed for fast and easy installation—with lower labor costs.
- Better "all-from-one source" service from National-U.S. Wholesalers—saves time and money.
- Prestige of two leading names in heating and air conditioning brings ready acceptance of builders and home owners—the result of expanding nationwide sales promotion and advertising programs.

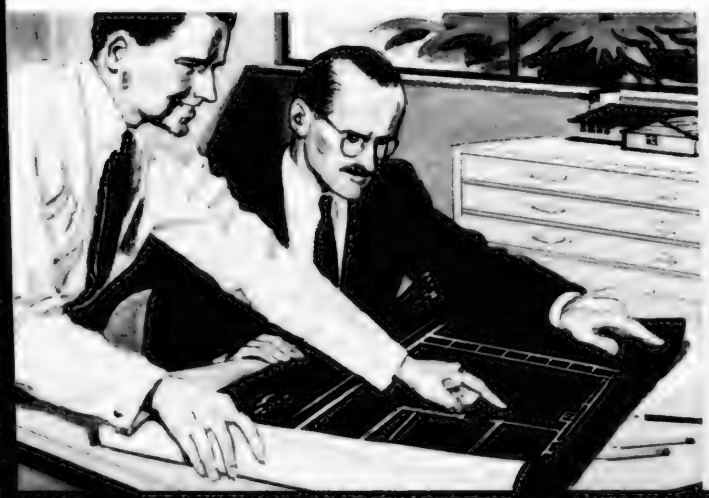
HEATING AND AIR CONDITIONING PRODUCTS
National-U.S. Radiator CORPORATION
FOR MORE HEALTHFUL - COMFORTABLE LIVING

HEATING AND AIR CONDITIONING

HEATING AND AIR CONDITIONING DIVISION

produced under one brand name—for any requirement—large or small.

• It brings expanded nationwide sales service through 11 strategically located manufacturing plants and 24 company owned and operated offices, adequately staffed by competent and experienced sales engineers.



to: Architects, Builders

• Availability of wide range of all types of hot water and steam heating products and air conditioning equipment to meet clients specifications for performance, compactness, appearance, economy of operation or unusual requirements.

• The facilities of the combined research and engineering organization assure you of up-to-the-minute developments in heating and air conditioning.

• The product reputation of the two combined companies for quality, dependability, efficient performance and long service builds client satisfaction.

to: Owners

• National-U.S. Heating products and air conditioning equipment incorporate the latest engineering achievements in design and construction for operating economy, performance efficiency and modernly styled appearance.

• These benefits mean long trouble-free service . . . for more healthful, comfortable living.

See Complete Line on next page ▶

PRODUCTS *for year round, more healthful, comfortable living*

HEATING AND AIR CONDITIONING PRODUCTS

National-U.S. Radiator CORPORATION

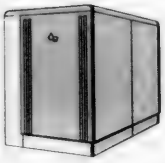
FOR MORE HEALTHFUL - COMFORTABLE LIVING

The Complete Line
of Hot Water and Steam Heating Products and Air Conditioning Equipment

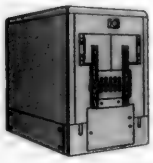
All Types — All Sizes — for all Structures
Residential — Institutional — Commercial — Industrial

BOILERS

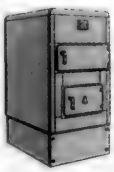
Cast Iron Boilers for automatic firing



Oil Boilers and Oil Heating Units



All-Fuels Boilers Convertible Type

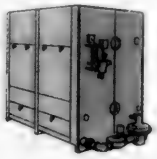


Residential Steel Boilers and Units

National-U.S. Packet for gas or oil firing

Commercial Steel Boilers for Automatic and Hand Firing

Gas Boilers Packaged

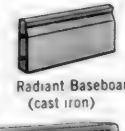


Gas Boilers Commercial

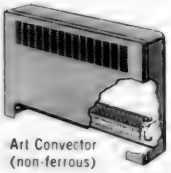
Gas Boilers Residential

HEAT DISTRIBUTORS

Art Baseboard (non-ferrous)

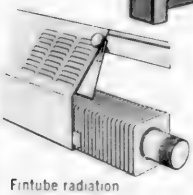


Radiant Baseboard (cast iron)

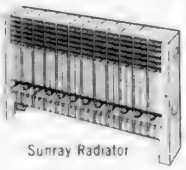


Art Convector (non-ferrous)

Aero Convector (cast iron)



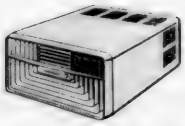
Fintube radiation



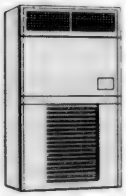
Sunray Radiator

Thin Tube Radiator

CAPITOLAIRE AIR CONDITIONERS

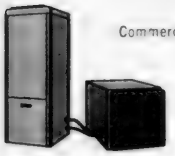


Room Air Conditioner

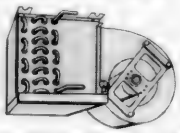


Commercial Packaged Air Conditioner

Capitolaire Console Summer-Winter Unit



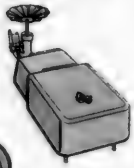
Air Cooled Residential Air Conditioner



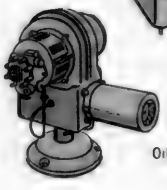
Capitolaire Horizontal Fan Coil Unit

Water Cooled Residential Air Conditioner

CONVERSION BURNERS



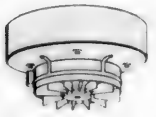
Gas Burners



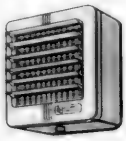
Oil Burners

UNIT HEATERS

Vertical (Down Flow) Delivery



Gas Unit Heaters



Horizontal Delivery

This newly compiled National-U.S. literature contains full information on each individual product in the complete line of Heating and Air Conditioning products

National-U.S. Radiator CORPORATION

HEATING AND AIR CONDITIONING DIVISION
Johnstown, Pennsylvania

Wholesalers—Get in touch with your nearest National-U.S. Branch Office

Dealers—See your nearest National-U.S. Wholesalers

Architects, Builders, Owners } contact your nearest National-U.S. Dealer

50M ALG156

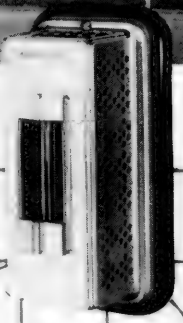
Printed in U.S.A.

SMALL HOSPITAL INSURES

Ideal Temperatures

Waste-Free Heating and Cooling

with JOHNSON CONTROL



The new 45-bed St. Joseph Hospital* in Del Norte, Colorado, is an excellent example of the modern approach to the problem of temperature and humidity regulation in the smaller hospitals. The correct solution to that problem is a system of Johnson *Individual Room* Control engineered to meet the exact needs of the individual building.

AIR CONDITIONED AREAS

At St. Joseph's, in the air conditioned operating and delivery sections, optimum temperatures are maintained constantly by strategically located Johnson Thermostats in each individual room. The humidity of the conditioned air is also controlled at all times by Johnson Room Humidostats. Complete safety, *even in the presence of explosive anesthetic gases,* is assured by the use of pneumatic control apparatus.

HEAT REGULATION

During the heating season, Johnson *Individual Room* Thermostats control Johnson Valves on convectors to insure the exact temperature desired in all other rooms of the building, including all patient rooms, offices and public areas. Comfort control is also provided on the building's unit ventilators.

In addition to *individual room* control, behind the scenes other Johnson Thermostats, Valves, Dampers and other controllers regulate the basic operation of the heating and air conditioning equipment. All apparatus is combined into a single, highly efficient system that not only provides the finest in individual room temperature regulation but accomplishes all this at the lowest possible heating and cooling cost.

In hospitals everywhere—and in all other types and sizes of buildings, new or existing—Johnson Control automatically insures the ultimate in comfort, convenience and economy. Each Johnson System, like the one in St. Joseph's, is planned to meet the exact needs of the individual building.

Next time you have a temperature or humidity control problem, talk it over with an engineer from a nearby Johnson branch. He draws on the more than 70 years' experience of the only nationwide organization devoted exclusively to planning, manufacturing and installing automatic temperature control systems. His help is yours for the asking. Johnson Service Company, Milwaukee 1, Wisconsin. Direct Branch Offices in Principal Cities.

*St. Joseph Hospital, Del Norte, Colorado. Thomas & Sweet, architects, Colorado Springs; K. J. Murray, mechanical engineer, Denver; Howard Whitlock Construction Co., general contractor, Pueblo; Brickham & Tomberlin, mechanical contractor, Denver.

JOHNSON CONTROL

TEMPERATURE AIR CONDITIONING

PLANNING • MANUFACTURING • INSTALLING • SINCE 1885

This plant is safer since they put these Crane valves on hazardous fluids

THE CASE HISTORY—How safely you handle hard-to-hold combustible fluids can depend on the valves you use. Read how a large Midwestern printing and binding plant, by changing to the right valves, encouraged employee care and safety while stopping hazardous leakage and waste.

The plant's supplies of kerosene, naphtha, benzol and similar fluids were stored in a fireproof room. But the danger was in the constant dripping and leakage at the tanks.

The original pump apparatus on the drums was discarded and ordinary valves were installed for drawing supplies. Still the hard-to-hold fluids dripped and leaked—through the valve packing and stuffing box, and at the seats. Fluids were lost . . . the high maintenance costs continued . . . and the unsafe conditions remained.

Changing to Crane No. 130 brass valves on the drum outlets stopped all previous trouble.

To-date they've given more than a year of leak-free, maintenance-free service. These valves have special features for handling light oils, gases and volatile fluids.

Underwriters' Laboratories approved for LP-gases, Crane No. 130 valves have a composition disc soft enough for tight seating, yet stiff and resilient to take hard wear. The disc, cemented in its holder, prevents around-the-disc leakage. The stuffing box with molded asbestos packing is extra deep for durable stem sealing.

No. 130 valves are typical of Crane quality and value, and the complete selection you have in the Crane line in valves and fittings for every flow control need.

You'll find that specifying and ordering Crane materials will lead to lower ultimate costs for your piping equipment.

CRANE VALVES & FITTINGS

PIPE • KITCHENS • PLUMBING • HEATING

Since 1855—Crane Co., General Offices: Chicago 5, Ill. Branches and Wholesalers Serving All Areas

OUT OF SIGHT, SILENT, SAFE and

CLEAN!

KRITZER

Radiant Panel Heating

offers *every* advantage to both the Heating Contractor and his customers.

QUICK AND EASY INSTALLATION—One section of KRITZER Radiant Coils equals many lengths of ordinary tubing. The Heating Contractor can install the entire system without requiring special cooperation from other contractors because the coils are not imbedded in any building material.

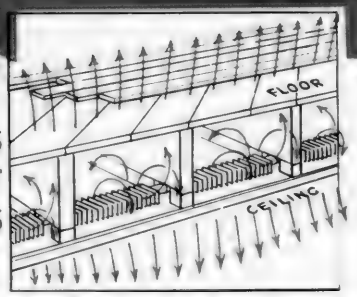
OUT OF SIGHT—No unsightly registers or radiators. Completely comfortable wall-to-wall living area.

SILENT—No noise of fan blown air through registers. KRITZER suspension of coils assures quiet during expansion and contraction of heating cycles.

SAFE—KRITZER coils touch no part of the building. They heat air only. Aluminum fins on lifetime copper tubing will not rust or discolor.

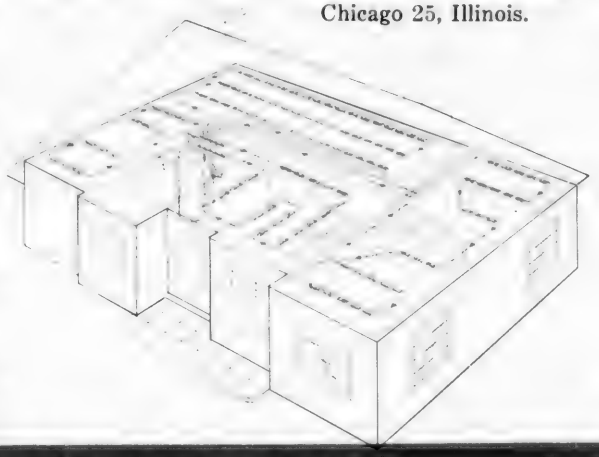
CLEAN—Gentle, dust-free warmth fills each room. There are no "hot spots" to cause dirt streaking of walls and ceilings. No gusty blasts of dusty air.

THIS IS HOW IT WORKS

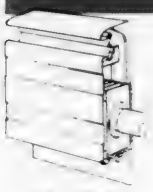


Runs of coil sections are installed at right angles to the ceiling joists, distributing even heat to the ceiling and/or floor surfaces. These comfortably warmed areas radiate healthful heat energy throughout the room. Shown below is a typical coil layout in the average home.

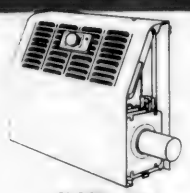
Kritzer Radiant Coils, Inc., 2901 Lawrence Avenue, Chicago 25, Illinois.



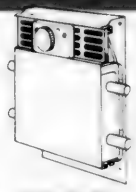
KRITZER QUALITY HEATING PRODUCTS



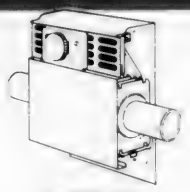
"K" LINE BASEBOARD



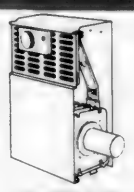
SLOPE TOP BASEBOARD



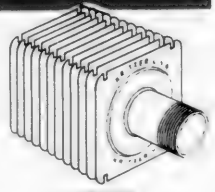
STANDARD BASEBOARD



UNIVERSAL BASEBOARD



CONVECTOR, SLOTTED FRONT



KRITZER FINNED TUBE

KRITZER

REPRESENTATIVES IN PRINCIPAL CITIES

SEE YOUR JOBBER FOR KRITZER PRODUCTS

"IF IT'S KRITZER, IT'S RIGHT, SIR!"

you specify with *Confidence* when you choose

Airtemp air conditioning

Plan for AIRTEMP Air Conditioning—it's virtually trouble-free!

No "bugs" to be worked out—*you're sure of perfect performance always* because every AIRTEMP job is backed by 21 years of advanced engineering by *Chrysler*. Whether your needs are large or small, the complete AIRTEMP line will meet your every requirement.

In determining the *one best* system for any building, in planning the layout and in the actual installation . . . you can count on expert guidance from top engineers of Airtemp Construction Corporation. And to *guarantee* your installations during the years to come, the nation-wide network of AIRTEMP personnel provides dependable service in every major community.

As the years go by, your clients will have tangible evidence of your wisdom in specifying AIRTEMP. They will appreciate particularly the low operating costs that result from modern, efficient design.

For full information on how AIRTEMP can meet all of *your* air conditioning needs, write: Airtemp Construction Corp., Dayton 1, Ohio.

AIRTEMP BUILDS AIR CONDITIONING TO FIT EVERY REQUIREMENT

THE *FORWARD* LOOK IN AIR CONDITIONING

A FEW AIRTEMP DREAMS THAT BECAME REALITIES!

Union Pacific Building
Omaha, Nebr. Architect: Davis Hunt, Chicago; Engineers: Ritter & Mott, Chicago; Contractors: James Stewart & Co.

Magnolia Building
Dallas, Texas. Air conditioned in 1938. Architects and Engineers: Lang & Weichel.

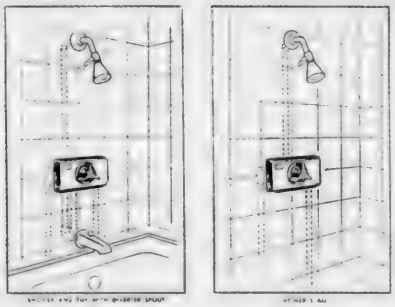
Airtemp
CONSTRUCTION CORPORATION
SUBSIDIARY OF CHRYSLER CORP.

AIR CONDITIONING • HEATING FOR HOMES, BUSINESS, INDUSTRY

POWERS

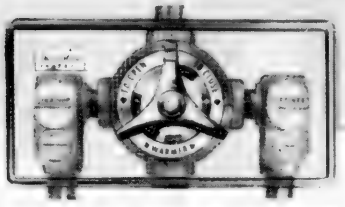
NEW Hydroguard®

Best Insurance for SAFE, Comfortable Showers!

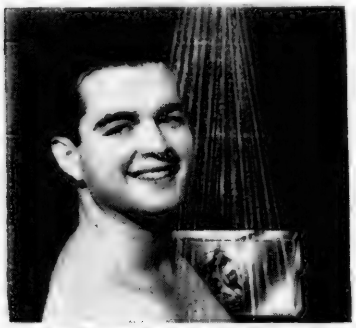


More Convenient for Bathers
HYDROGUARD installations are uncluttered with various valves. Because it has a built-in *shut-off valve* none is required between it and the shower head. HYDROGUARD is often used with shower heads having built-in *volume control.* For shower and tub control it is used with diverter spout as shown above.

HYDROGUARD introduces an advanced style trend in shower control. It provides greater convenience for bathers and neater appearance. It is available for concealed piping (above) and for exposed piping.



New Triple Duty STRAINER-CHECK-STOPS concealed behind the HYDROGUARD cover, simplify piping and tile work. Walls are unmarred by protruding knobs or valve handles. With only one dial to turn instead of the usual 2 to 4 valves, there is no confusion on the part of the bather.



Don't skimp on Safety in Showers
Get POWERS SAFE SHOWER SYSTEMS data.
Call your nearest Powers office.

(c53a) ® Reg. U. S. Pat. Off.

Dynamic New Design Simplifies Shower Installation

Powers HYDROGUARD Is Thermostatic. It is the finest shower control money can buy. It always maintains the shower temperature wherever the bather sets it . . . regardless of *temperature* or *pressure changes* in water supply.

Thermostatic SAFETY LIMIT Protects Bather from Scalding. It prevents flow of water to shower above 110°F. Should cold water supply fail HYDROGUARD instantly and completely shuts off hot water.

Conserves Water formerly wasted while adjusting various valves before bathing and jumping in and out of shower because of temperature changes.

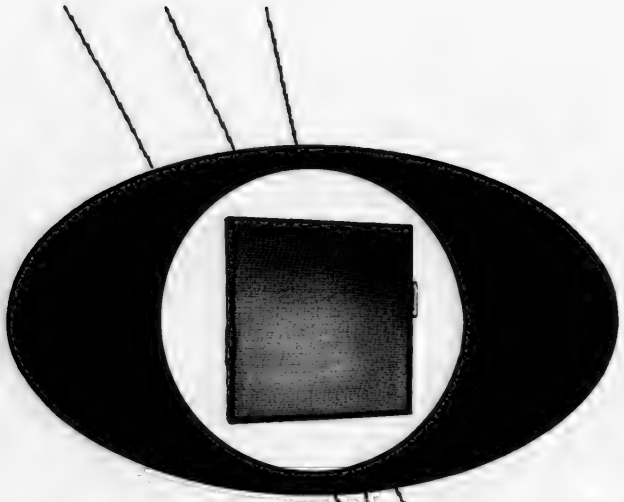
Consult Powers on Shower Planning. Call our nearest office for data on POWERS SAFE SHOWER SYSTEMS. An experienced Powers engineer will gladly help you select the best shower controls for your requirements.

For further information write for Bulletin 366

THE POWERS REGULATOR COMPANY

SKOKIE, ILLINOIS | *Offices in chief cities in U.S.A., Canada and Mexico*

65 Years of Leadership in Water Temperature Control



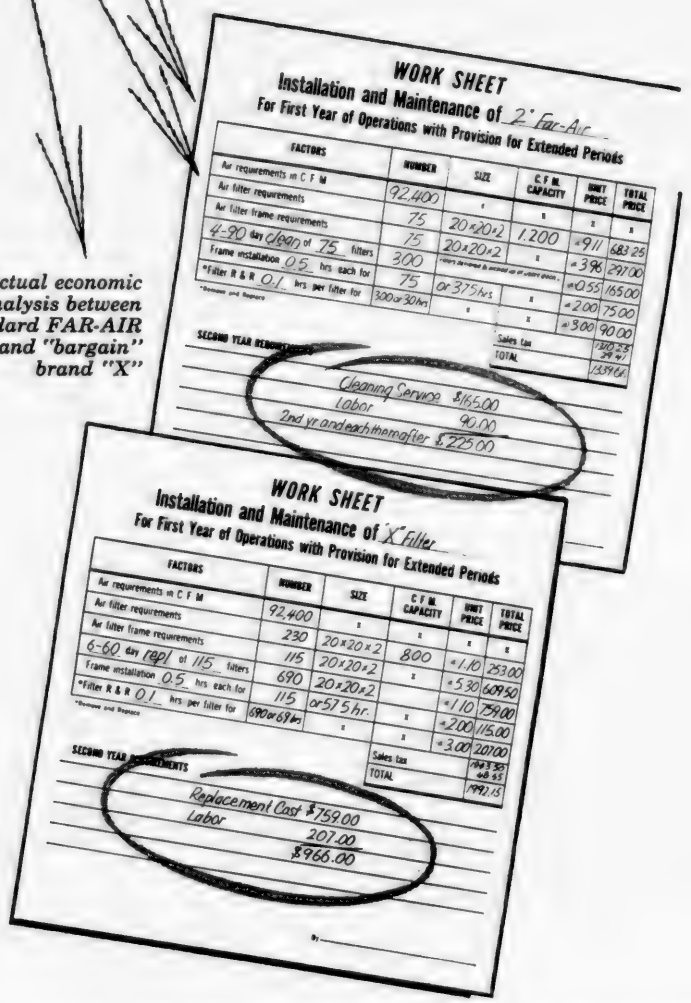
NOW—
you can be sure you are right

Because most filters are efficient at cleaning air, you are reasonably sure of getting a satisfactory job when you install an established make. The service life of your expensive air conditioning machinery and the comfort of your building depend on the ability of relatively low cost filters to do their job.

FARR Company, as one of the country's leading filter manufacturers, wants to insure that your are getting the most value out of your present filters, regardless of make. Therefore, they will send a field engineer who is an air filtration expert, to carefully analyze your air filters and submit a factual, written report like the one shown, on his findings. Often he can make suggestions that will greatly increase your filtration efficiency and save a substantial amount of money in operating costs.

FARR Company is making this service available to you on a no cost basis because it will increase your appreciation for the function of the often-neglected air filters. It will point out the importance of buying standard brand filters. It will in some cases result in sales for FAR-AIR filters . . . and that is important, too.

Why not try this service? It is factual, honest and subject to favorable comparison by any reputable manufacturer. Write today to Farr Company, P.O. Box 45187, Airport Station, Los Angeles 45, Calif.



WORK SHEET

Installation and Maintenance of 2" Far-Air

For First Year of Operations with Provision for Extended Periods

FACTORS	NUMBER	SIZE	C F M CAPACITY	UNIT PRICE	TOTAL PRICE
Air requirements in C F M	92,400	"	"	"	"
Air filter requirements	75	20×20×2	1,200	@ 9.11	683.25
Air filter frame requirements	75	20×20×2	"	@ 3.96	297.00
4-90 day clean of 75 filters	300	*Hours developed & accrued on 4th cleaning period	"	@ .055	165.00
Frame installation 0.5 hrs. each for	75	or 37.5 hrs	"	@ 2.00	75.00
*Filter R & R 0.1 hrs. per filter for	300 or 30 hrs	"	"	@ 3.00	90.00
*Remove and Replace				Sales tax	30.25
				TOTAL	29.47
					1359.60

SECOND YEAR REQUIREMENTS

Cleaning Service $165.00
Labor 90.00
2nd yr. and each thereafter $ 225.00

WORK SHEET

Installation and Maintenance of X Filter

For First Year of Operations with Provision for Extended Periods

FACTORS	NUMBER	SIZE	C F M CAPACITY	UNIT PRICE	TOTAL PRICE
Air requirements in C F M	92,400	"	"	"	"
Air filter requirements	230	20×20×2	800	@ 1.10	253.00
Air filter frame requirements	115	20×20×2	"	@ 5.30	609.50
6-60 day repl of 115 filters	690	20×20×2	"	@ 1.10	759.00
Frame installation 0.5 hrs. each for	115	or 57.5 hr.	"	@ 2.00	115.00
*Filter R & R 0.1 hrs. per filter for	690 or 69 hrs	"	"	@ 3.00	207.00
*Remove and Replace				Sales tax	843.50
				TOTAL	68.65
					1997.15

SECOND YEAR REQUIREMENTS

Replacement Cost $759.00
Labor 207.00
$966.00

By

ORIGINATORS OF FAR-AIR CERTIFIED FILTER SERVICE

FARR COMPANY

NO COMPROMISE ON QUALITY

Los Angeles, New York, Chicago
New Orleans

An actual economic analysis between standard FAR-AIR filters and "bargain" brand "X"

Dual unit installation of shop-assembled B&W Integral-Furnace Boilers, Type FM, at Elmer St., Trenton plant of John A. Roebling's Sons Corporation, subsidiary of Colorado Fuel and Iron Corporation.

with Two More B&W FM Boilers *at* ROEBLING

A subsidiary of The Colorado Fuel and Iron Corporation

When John A. Roebling's Sons chose two B&W Integral-Furnace Boilers, Type FM, for their Elmer Street Plant in Trenton, N. J., they acted with the assurance born of experience. Nearly two years before, a single FM boiler had been put in operation at the company's Buckthorn Plant and its economical operation, dependability and B&W service were decisive factors in the selection of the additional FM units, which have been in service since October 1953.

Each of these compact, automatically controlled B&W FM Boilers is oil-fired with a B&W Y-Jet oil burner and is designed to supply 28,000 lb of steam per hr at pressures of 235 psi. They combine the fuel saving, space saving, and other practical benefits of "package" steam with many of the cost-saving advantages inherent in big-boiler design, and the result is substantial overall economy.

Repeat orders for B&W Boilers are an old story at Roebling. Even before the first FM was installed, three B&W Integral-Furnace Boilers, Type FH, started the trend with performance that has, on the record, brought consistently large annual savings. And last year, Roebling placed two more FM units in service, a total of five in their various plants.

Like Roebling, many other companies including industrial plants, utilities, and other users have found the versatile, self-contained B&W FM Boiler most suitable for their steam requirements. Units having a total steam capacity of well over 11 million lb per hr are now in service or on order. The FM Boiler is available in standard sizes for loads to 40,000 lb per hr at steam pressures to 235 psi. Many are in operation at higher pressures and with moderate superheat. Write for Bulletin G-76C for a detailed description of this boiler. The Babcock & Wilcox Company, Boiler Division, 161 East 42nd Street, New York 17, N. Y.

Consider these
COST SAVING FEATURES
in terms of your steam requirements

- Saves Erection Time and Cost
- Meets Wide Range of Service
- Handles Quick Load Changes
- Fast Steaming
- Low Maintenance
- Easy Accessibility
- Suitable for Outdoor Service
- Burns Oil and/or Gas
- Saves Fuel
- Saves Space
- Safe, Automatic Operation

G-641

BABCOCK & WILCOX

BOILER DIVISION

PRODUCT APPLICATIONS

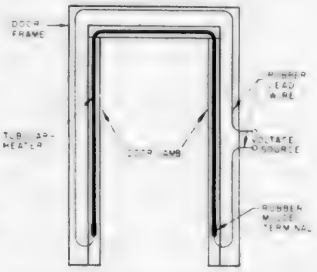
New, Unusual, or Ingenious Uses of Equipment and Materials

Conducted by WM. B. FOXHALL, Associate Editor

Ice-Bound Doors Freed by Electric Heat

PROBLEM: When walk-in freezer doors open, there is an inrush of warm air over the cold door jam. The resulting condensate quickly freezes when the door is closed forming an ice lock between door liner and door frame. Forced opening of such ice-bound doors results in costly maintenance to doors and door liners as well as to conveyor carts used as battering rams.

SOLUTION: In a typical installation, electric tubular all-metal heating elements are placed inside the door jamb, directly opposite the liner-seal on the door. Part of the old door frame was removed and replaced with angle iron sections containing the clamped-in or brazed on tubular element. A low cost voltage regulator and switch are located outside the door for maintaining a narrow strip of heated surface at about 40 deg F. The basic electric unit, a Chromalox element manufactured by Edwin L. Wiegand Co., of Pittsburgh, requires about 15 watts per foot, operating on 115 line voltage.



RESULTS: The enclosed element heats up quickly and cannot be damaged by frost or moisture. Doors open easily preventing costly maintenance and inefficient operation due to air leakage around broken or distorted door liners.

Piping of Atom-Powered Plant is Welded

PROBLEM: When the world's first commercially distributed supply of electricity from an atomic reactor surged through the lines of the Niagara Mohawk Power Co. at West Milton, N. Y., it represented the end product of a complex system of piping and controls. Members of the technical staffs of General Electric Co., generator designers, the Atomic Energy Commission, the Navy, and Tube Turns, conferred frequently in developing the piping for the prototype reactor.

SOLUTION: Critical portions are fabricated of Schedule 40 Type 347 stainless steel pipe and Tube Turn welding fittings of matching material. The lines range from 2 inches through 8 inches. The electricity is produced with excess steam furnished when testing a landbased prototype of the reactor to be used in powering the world's second atomic submarine, the Seawolf.

RESULTS: The use of welding fittings helps to provide optimum float conditions, leakproof joints, and other important advantages in the piping of steam and condensate for the driving system of a turbine generator with the capacity of 12,500 kilowatts.

Chemical Fog Shows Boiler Leaks

PROBLEM: Production manager William C. Beattie at Consolidated Edison in New York, estimated that undetected air leaks in boilers were costing the company about $100,000 yearly in fuel and maintenance costs.

SOLUTION: In a new leak-detecting method devised by J. Stephen Ungar, assistant chief performance engineer for Con Edison, introduces Pydraul F-9 into the boiler by means of a Todd Industrial Fog Applicator to produce a steady flow of visible fog from every leak. After the boiler is thoroughly bottled up, forced draft is admitted to build up a furnace pressure of 0.3 to 0.5 inches of water. The fogging machine then is used to produce a fog of fire-resistant fluid, product of Monsanto Chemical Co., St. Louis, Mo. The fog is introduced by a hose through an access door or other opening. For pressurized boilers, the hose connection is made to a gate valve. The fog is generated until all leaks are observed and marked on the boiler's exterior walls.

RESULTS: A minimum amount of boiler down time is required by the method since the fog is neither so plentiful nor so obnoxious as to hamper leak detection. Fog testing at regular intervals catches air leaks in boilers before the leakage has caused a serious breakdown in boiler efficiency.

Steam Generators Help Clean Hotel

PROBLEM: At the 800-room Marott Hotel in Indianapolis, stoker 9 fired boilers were producing smoke and ashes which had to be cleaned both from the inside and outside of the building. The hotel has 14 dining rooms and other large convention facilities, which put an extremely variable load on the boilers.

SOLUTION: Four packaged steam generators were installed to replace the old boilers. The equipment consists of one 90 hp and three 125 hp steam generators manufactured by York-Shipley, Inc., York, Pa. The three larger units operate at low pressure and burn No. 6 fuel oil. The 90 hp generator operates at high pressure and will burn either No. 6 fuel oil or natural gas.

RESULTS: The new steam generators supply hot water and heat for the entire building as well as process steam for the kitchen cookers, steam tables and dish washers. Air pollution by smoke and ash has been nearly eliminated and fuel savings of between 10 and 15% have been realized.

Maqufacturers Trust Company Engineers Johnson (left) and Byrne checking a p-k chiller insulated with rock cork at the factory. Architects for the building were Skidmore, Owings & Merrill; general contractor, George A. Fuller Co.; mechanical engineers, Syska & Hennessy; mechanical contractor, Baker Smith & Co. Photo at left by Ezra Stoller.

Worthington relies on p-k chillers in the world's most distinctive bank building

When this "house of glass" opened at the corner of Fifth Ave. and 43rd Street in New York last year, 40,000 visitors came to take a look. Small wonder! For in this newest and largest branch of Manufacturers Trust Company, they saw architectural history being made.

No longer are bank tellers "caged." Customers transact their business in a new atmosphere of space, light and friendliness.

Contributing to this feeling of unhurried friendliness are two 150-ton Worthington air conditioning units, each equipped with a p-k dry expansion Freon chiller. This super-efficient system "reconditions" all five stories of the building every three to five minutes with 97,000 cu. ft. of fresh, low-humidity, 74 F air. It's automatic, too, shutting down by itself at 11 P.M. and starting again at 6 A.M., to assure a comfortable working climate for the bank's 280 employees – and their customers – at the start of each day.

Teamed up with Worthington's famous "million dollar" compressors, p-k chillers each supply blowers with 331 gallons of water per minute, chilled from 50 F to 40 F.

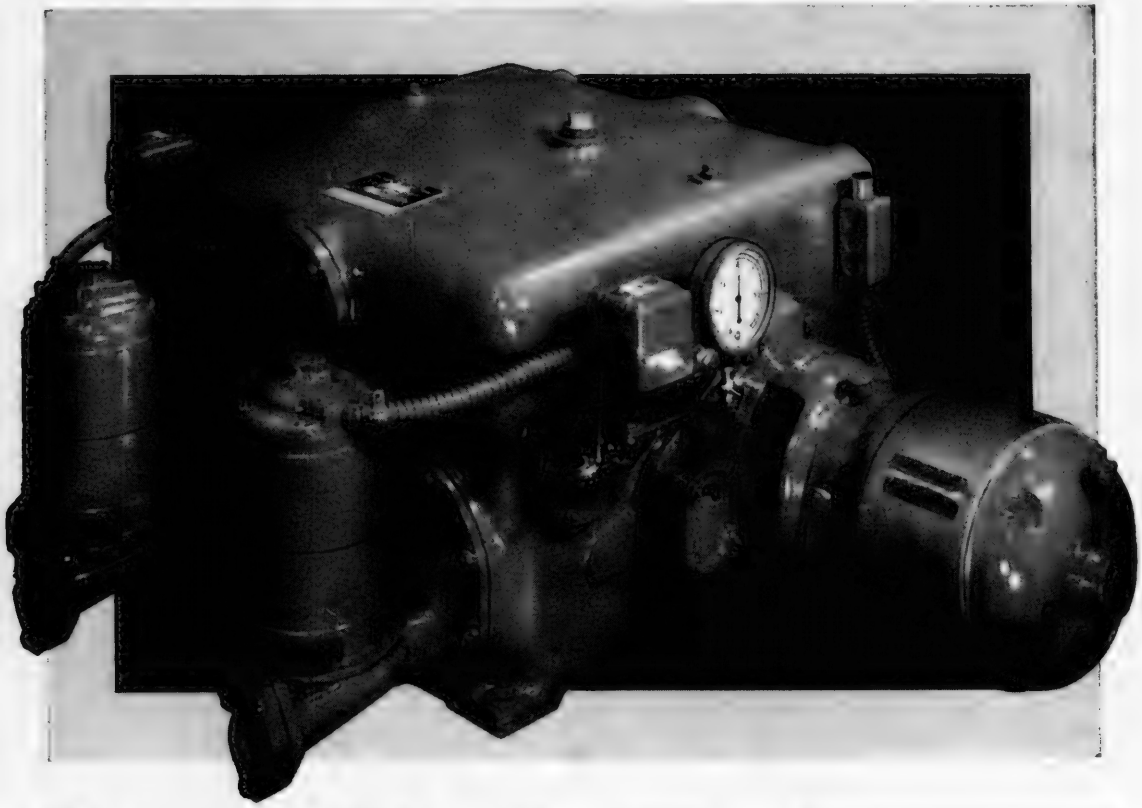
For full information on these complete units write Worthington Corp., Dept. PK, Harrison, N. J. today. Or write for Catalog 101 on p-k chillers to The Patterson-Kelley Co., Inc., 930 Burson Street, East Stroudsburg, Pa., and principal cities.

PATTERSON-KELLEY

Flooded and Dry Expansion Type Freon Coolers and Storage Water Coolers • Freon Condensers • Allied Refrigeration and Air Conditioning Equipment

THIS NEW VACUUM HEATING PUMP

HAS THE INCREASED AIR CAPACITY EFFICIENT HEATING PRACTICE DEMANDS



It's the Nash CSM

Designed and manufactured by the organization that made the Jennings Manifold Heating Pump standard of the Heating Industry, the new CSM incorporates every desirable feature architects, engineers, owners and operators have sought. Employing separate air and water pump elements, each with its own motor and each independently controlled by its own automatic switch, the capacities and arrangement may be widely varied to meet job conditions. For the first time, the engineer has the choice of realistic water and air capacities required for rapid system response without wasteful overheating.

These pumps possess many other features which permit a more efficient utilization of fuel and minimum use of electric power. Low, low returns reduce installation costs and usually eliminate putting the pump in a pit. Simplicity and efficient operation reduce supervision and maintenance costs. Information regarding this new heating pump development is available immediately upon request.

- Increased air capacity induces rapid system response without wasteful overheating.
- Separate air and water pumps individually selected to meet actual job requirements.
- Control system that operates individual pumps only when needed.
- Flexibility permitting addition of radiation without changing basic pump installation.
- Low, low, return line connection.

NASH ENGINEERING COMPANY

437 WILSON, SO. NORWALK, CONN.

HOW TO AIR CONDITION CHURCHES

JACK F. SCHMIDT
Advanced Engineering Department, Carrier Corp., Syracuse, N. Y.

Air conditioning has been the means for promoting church attendance and income during the summer months. In general, one of four types of systems may be installed. This article covers the advantages and disadvantages of each and has data for the engineer interested in design and installation of air conditioning systems in churches.

SEVERAL types of systems have been used successfully to air condition churches. These systems may be for summer cooling only, but more often are combined with heating systems to provide year around air conditioning. The four main types of systems and some of their advantages and disadvantages are listed in Table 1. Which system to use should be ascertained only after a detailed study of the following:

1. First cost of equipment.
2. Owning and operating cost.
3. Building cost of new churches—remodeling and alteration cost of existing churches.
4. Space requirements.

Direct Expansion Systems

Direct expansion systems are basically the same as the ones used in other large air conditioning installations. This system has many advantages.

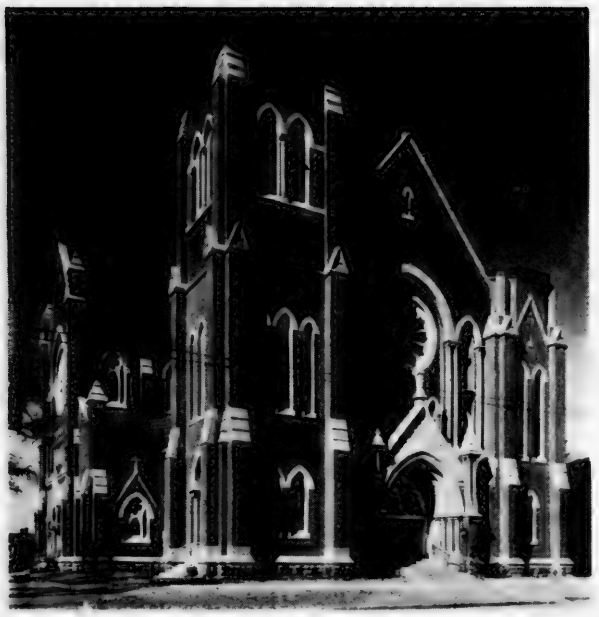
Full capacity is available at all times. This is important because, with the addition of air conditioning, the church becomes available for more activities. The direct expansion system requires less floor space and since churches are always trying to find space for another Sunday School room, an extra office, or for storage, this space has tangible value.

This type system is simplest from engineering and installation viewpoints as well as from a maintenance and operating viewpoint, because most engineers and servicemen have had experience with this type of system. It has a high salvage value and for churches that plan to enlarge their facilities at a later date, this is most important.

The direct expansion system has lowest operating cost. First costs are low to medium ($30 to $55 per seat), depending on the conditions of the particular job. However, the use of self-contained units, particularly in the larger sizes, has many times proved to be the system with the lowest first cost.

TABLE 1. CHARACTERISTICS OF FOUR AIR CONDITIONING SYSTEMS

Type System	Advantages	Disadvantages
Direct expansion applied system	Full capacity at all times; least floor space; simple engineering and installation; high salvage value; lowest operating cost.	Medium first cost.
Direct expansion self-contained system	Full capacity at all times; simplest engineering and installation; highest salvage value; lowest operating cost; low first cost.	
Ice or water storage system	Low operating cost.	Largest floor space requirement; highest first cost; 24 to 48 hr. recuperation period needed.
Ice melting system	Lowest first cost.	Highest operating costs; non-automatic operation; poor temperature and humidity control; large space requirements.



An air conditioning system was installed in the Sacred Heart Cathedral, Dallas, Tex.

Ice or Water Storage System

Ice or water storage systems have been installed in many churches and are popular in some sections of the country. This system combines a chilled water system with a storage tank for storing cold water, or a commercially available container, for making and storing ice. In this type system, a relatively small condensing unit operates continuously 24 to 48 hours prior to the peak load, to store up the necessary capacity.

The advantages of this system are low operating cost. The disadvantages are large floor space requirement, long recuperation periods (24 to 48 hours for a church), and highest first cost which ranges from $35 to $60 per seat.

Operating Costs

The operating cost of air conditioning systems for churches are low due to the few hours of operation per week. Operating cost during the cooling season may run less than one cent per person per week, to about two cents per person. This cost will vary according to church construction, usage and system operation. Direct expansion systems are lowest in operating costs in most cases, regardless of the power rates, because the church requires a relatively large amount of cooling for only five to ten hours during the week.

When power rates are based on demand charge for the connected horsepower, plus a low rate on the amount of current used, the direct expansion system is still lowest in operating costs, if the effect of the structure storage and stratification are taken into account. These effects are discussed later. When the structure is used to store cooling effect, the installed horsepower is reduced so that the demand rate is also reduced. The use of the structure to store cooling in an ice storage system is impractical because it would increase the size of plant required and thus operating costs.

Ice Melting System

While an ice melting system is lowest in first cost, it is highest in operating cost, and cannot be operated automatically. It has large space requirements, and may result in poor temperature and humidity control. For these reasons it is seldom used today.

The ice melting system is made up of a fan-coil (chilled water) unit connected to an air distribution system. Chilled water is made by spraying the recirculated water over a large tank filled with cakes of ice. The only difference between this system and a normal chilled water system is that the tank of ice replaces the water chiller. Otherwise, the fan-coil unit, ductwork, fan motors, controls, water piping and pump for the two systems are both the same.

The high operating costs are due to the need for buying refrigeration capacity in the form of ice. Poor temperature and humidity control are caused by several things. Since the capacity requirement in a church is determined to a great extent by attendance, and to a lesser extent by outside weather, the person ordering the ice has to be a weather and attendance prophet. If he overestimates the ice requirement, operating costs are wasted. If he under-estimates the ice requirement, the space temperature cannot be maintained. Also, as the amount of ice decreases, the water temperature becomes higher, resulting in less dehumidification and thus a rise in relative humidity.

APPLICATION PROCEDURE

The application of air conditioning to a church entails aspects which are similar to many commercial practices. However, there are many important factors which are entirely peculiar to church air conditioning and these will be discussed.

Load Estimating

The first step in application is estimating the load. A church is similar in load to a theater in that people and outside air are major portions of the load. However, in addition, a church has a heat gain from the large glass area and increased solar and transmission loads due to mornings and midday occupancy. These are important factors that one must consider.

Equipment room in the basement of the Sacred Heart Cathedral.

Storage Effect

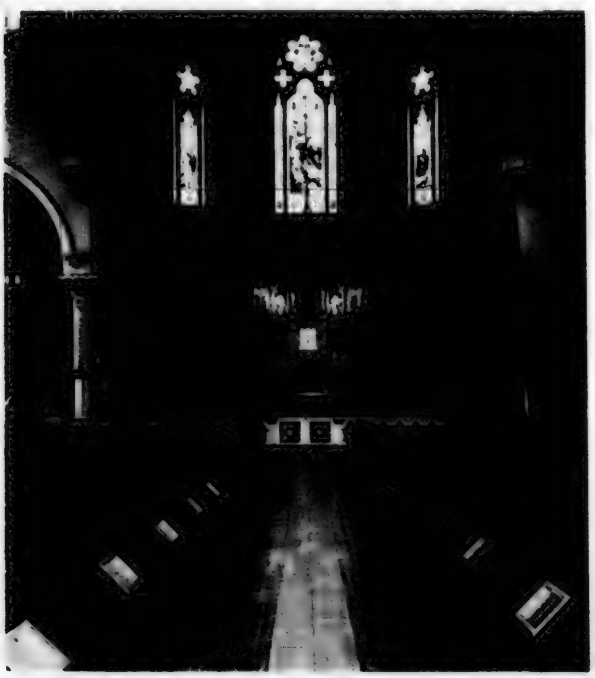
Because of the infrequent operation of most church systems, storage effect of the structure must be considered. The heavy construction, plus the large mass in the pews, results in a great amount of heat storage. This storage effect can be either positive or negative.

When the air distribution system is first started, an extra load is imposed on the equipment because of heat stored in the structure. Up to an hour may be required to pull down the temperature of this mass to design temperature. However, if the system is operated correctly, this additional load can be compensated for by closing the outside air damper during the pull-down period.

If precooling time is available, some cooling effect can be stored in the structure and pews, and this cooling used to offset the peak load. As people and outside air are such major portions of the load, considerable equipment capacity will be available for precooling. Tests conducted by the author on churches and other applications, have shown that when capacity is available as in this case, storage effect can be stored in relatively short periods of time, on the order of one hour.

Storage effect operates by precooling the mass of the building and furnishings two or three degrees below the temperature allowable at peak load. During peak load, the air temperature in the space rises to design conditions and the precooled mass absorbs heat and, therefore, reduces the load on the equipment (offsets a portion of the load).

Even in Roman Catholic churches where multiple masses follow each other each Sunday, storage effect can be used. Usually, the early masses are not as heavily attended as the later ones, and outside temperatures are lower during the early morning. All this excess capacity can be used for storage which in turn will offset the peak load occurring at the late masses. This storage effect can be used only if the peak load is of less than three or four hours of duration.



In the Sacred Heart Cathedral, Dallas, Tex., air distribution is by induction units at the ends of pews in the center aisle.

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He joined Carrier Corp. as a student engineer and has served in the development department as an engineering training instructor; assistant to the sales manager for air conditioning; supervisor in the application engineering department; and sales manager for applied equipment in the Midwestern District Office. At present, he is engineer in charge of the air conditioning unit section of the advanced engineering department.

He is a native of Chicago and holds membership in both ASHAE and ASRE.

Stratification

Due to the large ceiling heights and vaulted ceilings in most churches it is possible to maintain ideal conditions in the occupied zone without cooling the entire church volume. The hot air below the ceiling is allowed to remain there or to stratify and never becomes part of the load on the equipment and, except for a slight radiation effect, has no affect on the occupants.

To obtain stratification, the supply outlets must be kept relatively low. When ceiling outlets or side wall outlets are used close to the ceiling, the entire volume is cooled and no stratification occurs.

When the air distribution is from window sill height, transmission through the wall and window area above the 15 ft level can be neglected. However, solar heat gain through the entire window area must be calculated. When the sun shines through the glass, striking the floor or furnishing, this heat is absorbed, and becomes a part of the equipment load. Note that stained glass windows are similar to heat-absorbing glass and a reduction factor should be used. The magnitude of this factor depends on the type of glass. An average value of 0.70 can be used in the absence of precise data.

When side wall outlets are used, the transmission through the wall area over 5 ft above the outlets can be neglected. Again, the solar heat gain through the entire glass area must be used.

In both cases, the roof heat gain does not get into the occupied zone by convection. However, due to high temperature of the ceiling surface, radiation to the occupied zone does add to the load. This radiant load is usually taken as $\frac{1}{3}$ of the normal roof load.

An extra credit is obtained in churches having one or two services per Sunday when one-half of the outside air supplied is relieved by vents in the ceiling. This credit can be computed by the following formula: Btu per hr = $\frac{1}{2}$ outside air supplied in cfm $\times$ 1.08 $\times$ 5 deg. In churches having continuous and multiple services, this credit cannot be taken, due to the large infiltration that takes place between services when the doors are open continuously for 5 to 10 minutes.

When conditioned Sunday School rooms are in the basement below the sanctuary, and Sunday School is held prior to the service, the loads are not simultaneous. There-

One side of the altar, St. Patrick's R. C. Church, New Orleans, La. Grille above door at right delivers cool air to altar, pulpit and front of church.

fore, the refrigeration equipment is selected on the basis of the major load, usually the sanctuary, and separate air handling equipment is used for each space. Capacity control is required on the refrigeration machine to prevent coil frosting when only the small air handling unit is operating at reduced load. Many times there is sufficient capacity to cool the Sunday School quarters and at the same time precool the sanctuary.

Heat gain from occupants should be taken for the anticipated summer attendance, taking into account the increase due to air conditioning.

Ventilation

The quantity of ventilation air is excessive in many applications. This practice leads to excessive first and operating cost, as outside air is a large portion of the load. Ventilation air in churches can be 5 cfm per person unless local codes require more.

The large volume, infrequent use of the church building, and the absence of cigarette smoking, provide good conditions with low ventilation rates as compared to commercial applications.

AIR DISTRIBUTION

The main consideration in air distribution in churches is to supply the required air quantity without drafts or noise. The type of distribution system is not as important as the detailed engineering. Many different types of systems have been used successfully. As pointed out under Stratification, low distribution systems, floor registers, and side wall outlets supplying only the occupied zone, reduce the load requirement, and therefore are preferred.

An interesting example of air distribution is found in the Sacred Heart Cathedral, Dallas, Tex. Specially fabricated inductions units were placed along the center aisle at the ends of the pews. These units are served by two long ducts just underneath in the basement. Around the side walls are fan-coil units encased in cabinets also served by ducts in the basement. Special outlets provide spot cooling in the sanctuary and at the pulpit. By this unique method of air distribution, it was possible to cut the size of the cooling system from 125 to 83 tons.

Air outlets can be a problem in old churches as it was in St. Patrick's R. C. Church, New Orleans, La. This church was built in 1830 and contains many large murals. The paintings and other ornate features of the church made the positioning of outlets difficult.

Sound Level

Noise prevention is the greatest consideration in the design of the air distribution system. Everything possible should be done to eliminate or subdue the noise inherent in any system. Acceptable average sound levels for churches range from 35 to 40 decibels.

Duct Design

Main duct velocity of 1500 fpm and branch or runout velocities of 1200 fpm are suggested. Duct construction should be in accordance with good engineering standards. In all cases, duct turns or wide radius elbows are to be used. Velocity is not so important as proper duct design in preventing air-generated noises. Takeoff runs should be carefully designed and installed, especially when supplying air to an outlet. All square elbows or short radius elbows should be equipped with properly designed duct turns.

Return air grille locations are not critical except they should not be placed near people who are seated. Normal locations are the back of the church, the back of the rear pews, and in steps to the altar or stage. The return grille should be selected for a free area velocity not exceeding 600 fpm. Return air duct velocity should be 1200 fpm.

Dampers and splitters must be installed to allow good balancing of the system. Outlet velocities should follow the manufacturer's recommendation and this applies also to the quantity and distribution of the air from the outlets.

Even at the recommended velocities, extreme care must be taken in the manner in which outlets are connected to the supply air system. An outlet should never come from an abrupt take-off. If it is necessary at any time to connect an outlet to a main duct because of space limitations, sound absorbing materials of sufficient density and area should be used to prevent air generated noises.

Three wooden squares were removed and replaced with grilles underneath the balcony of St. Patrick's R. C. Church. These grilles are only noticeable when directly under the balcony.

Vibration and Noise Isolation

Flexible connectors between duct and fan units are required. Care should be taken in locating equipment so that vibration or other noise is not carried to the auditorium, either airborne or through structural transmission. When locating equipment on structural members, be sure that vibration eliminators are between the equipment and the members.

When short straight duct runs are necessary between outlets or return grilles and blower units, or where machine room noise may be carried through the ducts, serious consideration must be given to sound absorbing duct lining, sound absorbing cells, or baffles.

OTHER DESIGN CONSIDERATIONS

While other considerations in the design of church air conditioning are similar to commercial practice, certain differences do exist and these are covered briefly.

Controls

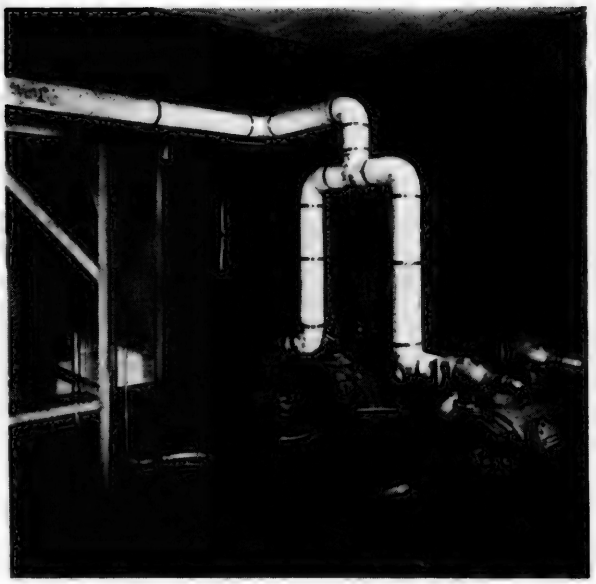
The controls of a church air conditioning job should be automatic to the extent that the available help can operate the equipment successfully. In most cases, the janitor will operate the system and, therefore, the controls should be simple for him to operate.

In some locations, it may be possible to hire an operating engineer who works week-days on a large commercial installation. With such an experienced operator, more manual controls can be used. Such an experienced man must be available at all times, otherwise the advantage is lost.

Usually, on-off control is adequate for the church auditorium. Sunday School rooms or an educational building usually require zoning and other means of room control due to changes in population and orientation effect. Small class rooms can usually be handled by volume control.

Operation of System

The equipment should be started several hours before the service to precool the church. First, the fan should be run with 100% outside air to flush out the auditorium and remove any odors accumulated during the week. This flushing out should be done early in the morning or late at night to take advantage of low outside temperatures. Then, the refrigeration should be turned on for precooling with the outside air damper closed. During the service the outside air should be open to the normal position, or manually controlled, to give enough outside air for the number in the congregation that day.



Two reciprocating compressors provide 40 tons of cooling for the Myers Park Baptist Church, Charlotte, N. C. A similar system serves the educational building. This church is illustrated on page 83.

Water Saving Devices

In localities where use of city water is freely permitted for air conditioning, city water is usually the most economical condensing means. Because of the low number of operating hours, it may take 10 years to pay off the cost of an evaporative condenser or cooling tower.

Effects of Covering Floor Panel Heating

Results of studies made on concrete floor panels at grade levels are contained in a paper on Performance of Covered Hot Water Floor Panels and presented at the 62nd annual meeting of the American Society of Heating and Air-Conditioning Engineers. The authors are E. L. Sartain, research associate in mechanical engineering, and W. S. Harris, research professor of mechanical engineering, both of the University of Illinois. It is Part I of a second report on a study being made of hot water flow type panel heating.

This paper discusses the heating characteristics of floor panel heating when covered with either rubber, asphalt tile or carpeting. Part II is expected to discuss the room conditions produced by the covered panels. The data included shows how the effects of these coverings can be estimated and applied when designing the heating system.

The following conclusions were reached upon the completion of the various test conditions investigated:

1. At design conditions, covering the floor panels with any type of carpeting had pronounced effects on the water temperatures, reverse loss from the panel, and the required boiler size.

2. Because of the large increase in water temperature required when carpet is applied to floor panels, it may be impossible to balance floor panel systems in which carpeting is used in some rooms only, unless the piping is arranged to permit zoning with the use of more than one water temperature.

Installing Steam Lines

For a distance of 850 ft, steam lines run from the power house to the Albert Einstein College of Medicine, Yeshiva University, Bronx, N. Y. A 2-in. high pressure return, 10 in. line for 185 psi steam and a 6 in. line for pumped condensate are run underground and protected by Gilsulate insulation. Pipe is supported in the trench by short lengths of asbestos-cement pipe filled with cement and placed crosswise, 10 ft center to center. Short metal rods are spot welded to the large extra heavy weight pipe to hold the lines in place until the insulation and backfill are in the trench.

Side boards are shown in place along the full length of the trench from the power house to the college. This conserves on the amount of insulating material required around the pipes. Better working conditions result.

Granular insulating material is poured from bags each holding 100 lb so that there is a minimum protecting thickness of 8 inches around the pipe for normal runs not under roadways. The Gilsulate is then tamped firmly.

The installation is now almost complete. The empty bags are thrown on top of the tamped insulation (an easy method of doing away with the trash) and earth is backfilled to ground level. Before the lines are placed in service, steam with a temperature not less than 370 deg F is run through the steam lines for at least 8 hours to form a permanent insulation envelope around the pipes.

The Degree-Day

Part 2

Use of the degree-day unit in checking operating results of heating plants and for estimating fuel requirements of such plants, together with maps and data derived from the degree-day.

AIR CONDITIONING, HEATING AND VENTILATING – MARCH, 1956

The Degree-Day A Fuel Estimating Unit

Part 2

CLIFFORD STROCK
Editor, Air Conditioning, Heating and Ventilating

Comprehensive tables of normal degree-day figures by months for 335 cities and yearly totals for 877 additional localities appeared in a Reference Section in the March, 1954, issue. This second section on the degree-day is devoted to (1) an explanation of the use of the degree-day in determining heating plant operating efficiency, (2) a rational method for estimating fuel or energy requirements of a heating plant, (3) tabular data for 413 locations for estimating such requirements, (4) a series of maps graphically showing similar data for the U. S., and (5) degree-day data for Alaska and Dominion of Canada.

As an example of the use of the degree-day as a guide to operating efficiency the following is presented, not as an actual case, but as a composite of several actual uses. The figures used in examples are entirely fictitious and intended only to demonstrate that the method is workable. Actually, the forms used and details of working out such a method depend on the particular problem, number of buildings under one management, and the individual ideas of the person inaugurating the system.

Based on past records, a chart such as shown in Fig. 1 is prepared. In this example, a day is used as the time unit. As the ordinate, the quantity of steam or fuel used per day per 1000 cubic feet of building volume is used. If only one building is under consideration, the ordinate could omit the *per 1000 cubic feet*. Where a number of buildings is being compared, however, the cubic feet basis enables comparisons among different buildings of varying sizes.

After study of past records, a standard, or par, or 100% measure of performance is set up. From this, lines representing 90% of standard performance, 110%, 80%, 120%, and so on are plotted, as shown. This is drawn only once, and from then on the daily records are compared against the chart. Obviously, if the standard has been properly set, readings over 100% represent sub-standard operation, readings under 100% good operation. Consistently sub-standard results should be checked into and operating procedures improved if possible. A wide variety of reasons can exist for below-standard or above-standard performance and every attempt should be made to determine what these are.

A second chart can be employed, as shown in Fig. 2, for recording the monthly performance of any building. Whereas Fig. 1 is drawn up once for each building, Fig. 2 is a blank chart, one being filled in for each building each month.

For each day of the month, the data for the bottom horizontal columns are filled in—only the top one, day of month, being printed in on the blank. The day of the week is filled in by initials, as shown; this is necessary since it will show up any variation from normal repeated on certain days of the week. For example, commercial buildings, such as offices, can be expected to show lower fuel or steam consumption on week ends when the building is only partly, if at all, occupied. The other columns are self-explanatory; the extreme bottom column is filled in by referring to Fig. 1.

The performance is then plotted in by days by drawing bars, as shown in the dashed lines for the first seven days. The purpose of this graphical portion of the chart is better

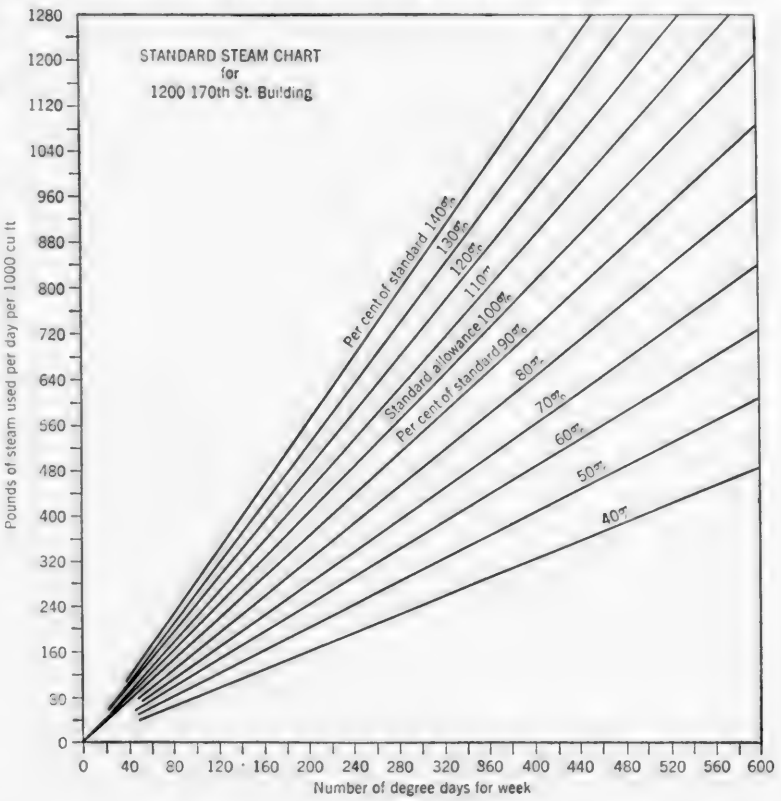


Fig. 1. Example of chart prepared for a specific building to check operating efficiency.

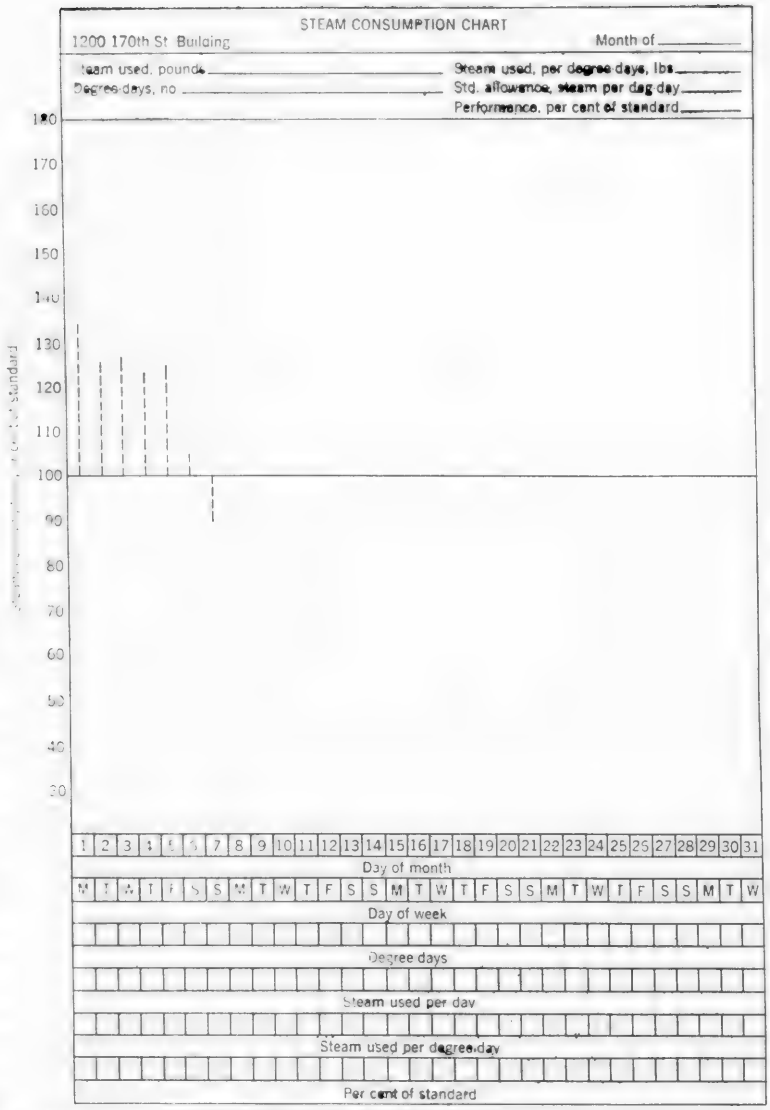


Fig. 2. Example of chart to record, on a monthly basis, operating results for a specific building.

to show up extreme or repetitive variations from normal.

Finally, the steam used for the whole month is obtained by totaling the daily figures, and this is also done for the degree-days. The monthly figures can then be inserted in the spaces at the top of the chart.

It can readily be seen that such a system or a similar one can easily be set up for almost any building where the necessary data can be obtained. Although steam or gas figures can be determined from meters every day, it is not too difficult to set up a system for weighing coal or measuring oil tank depletion.

Once the system is in operation, it can be kept in operation with ease and at very low cost. This cost may be far more than repaid when the system calls to the management's attention an increasing fuel or steam consumption due to faulty operation or equipment failure which otherwise might have gone on too long unnoticed.

The method shown here is a composite and can be varied widely. It may be that a weekly basis rather than a daily one would be more practicable. The system can even be a more simple one, such as the simple plotting on a graph of weekly energy consumption per degree-day. The details of the system depend on the size of the building and many other variables. The exact form and type of the system depends entirely on the enthusiasm and ingenuity of the person adopting the system.

Predicting Fuel Consumption

The example just cited is a case where the degree-day is used to eliminate the variation in outside temperature in rating the operation of existing buildings. An entirely different use of the degree-day unit is in predicting the future fuel (or steam or electrical energy) requirements in a building yet to be built, or in an existing building where, perhaps, a change in fuel or energy is contemplated. It is this particular use of the degree-day that originally led to the development of the degree-day years ago.

If the heat loss calculations for a building were accurate for the design conditions, and if the heat loss at any other outside temperature were proportional to that at design conditions, then the heat lost from the building for a whole heating season could be expressed by the equation

$$H = \frac{24hd(t_i - t_a)}{t_i - t_o} \quad \ldots\ldots\ldots\ldots (1)$$

where

H = seasonal heat loss in Btu,
h = hourly heat loss from the building for the design conditions, Btu,
t_i = inside design temperature, deg F,
t_o = outside design temperature, deg F,
24 = hours per day,
d = number of days in the heating season,
t_a = average outside temperature for the heating season.

For buildings where the inside design temperature is 70 deg, the formula becomes

$$H = \frac{24hd(70 - t_a)}{70 - t_o} \quad \ldots\ldots\ldots\ldots (2)$$

This formula is rational and workable if figures for d (number of days in the heating season) and t_a (average heating season temperature) are available. While some reference books state that the heating season in the United States extends from October 1 to May 1 and that the average outside temperature for the period from October 1 to April 30 can be used for t_a, this is incorrect; the length of heating season varies widely throughout the United

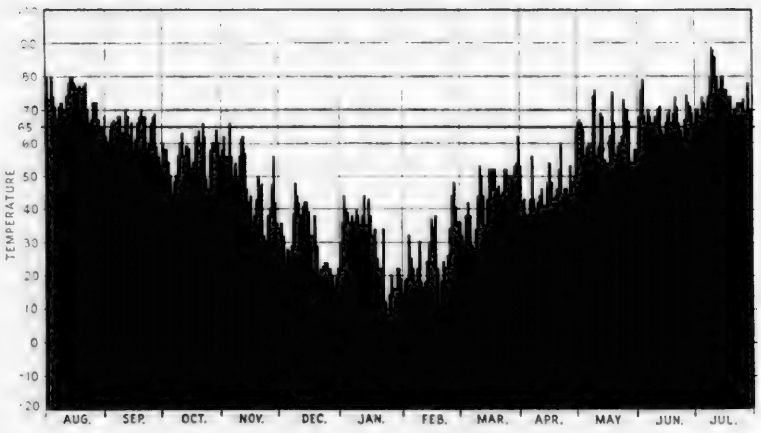


Fig. 3. Plot of daily mean temperature for a given year for a specific city.

States and, unfortunately, such a simple assumption is not applicable over the whole country.

However, the degree-day makes it possible to determine the number of days in a normal, or average, heating season for any locality for which sufficient weather data are available, as well as the average outside temperature during the period comprising the heating season.

If the *daily* mean temperatures for any city are plotted for each day in a given year, the result appears something like Fig. 3. As the fall season approaches, the trend of the temperature is to get colder and colder until the middle of winter is reached, following which it gets warmer and warmer until the summer, when the cycle begins again. This is true in all parts of the United States, the only difference being that the swing is not so pronounced in some parts of the country as in others.

Although the trend in the fall is for the weather to get colder, the temperature does not get colder uniformly but fluctuates more or less violently, being relatively warm one day and colder the next. If, however, we were similarly to plot for a city the *normal* daily mean temperatures for all the years for which we have records (that is, if we were to average all of the April firsts, then all the April seconds, then all the April thirds, and so on) the result would be a smooth curve as shown in Fig. 4. This curve shows graphically the normal daily mean temperature for a typical city.

This normal daily temperature curve will, for most United States cities, cross the 65 deg line as shown, except in the extreme south, where the normal curve at all times is above the 65 deg line, and in the far north and west, where, in many localities, it is always below the 65 deg line.

The whole concept of the degree-day is that heating is required on days having degree-days, and heating is not required on days having no degree-days. Therefore, the heating season in a normal year begins on the date when the normal daily mean temperature crosses downward over the 65 deg line, and ends where it crosses upward over the same line. The length of the heating season is the number of days between the two crossings, and thus d (number of days in the heating season) in equations (1) and (2) can be determined for any city for which normal daily temperatures are available.

The degree-day is a product of time (in days) and temperature, and when a graph such as Fig. 4 is plotted in days on the horizontal scale and daily mean temperature on the vertical scale, the number of degree-days D in the heating season is indicated graphically by the shaded area in Fig. 5.

Referring to Fig. 5, if the shaded area represents the number of degree-days, then this area is equal to the base of the area, d, times the average altitude of the irregular area, t_x, or

$$D = dt_x \quad \ldots\ldots\ldots\ldots\ldots\ldots (3)$$

As shown on the graph,

$$t_x = 65 - t_a \quad \ldots\ldots\ldots\ldots\ldots\ldots (4)$$

so that

$$t_a = 65 - \frac{D}{d} \quad \ldots\ldots\ldots\ldots\ldots\ldots (5)$$

Consequently, the average outside temperature (t_a) can be found by equation (5).

Once d and t_a are available for any city the heat required can be calculated by equation (2). For example, what would be the heat required for a residence in New York where the design heat loss is 70,000 Btu per hour, $d = 241$ and $t_a = 44.0$ deg and $t_o = 0$ deg?

Substituting in equation (2)

$$H = \frac{24 \times 70{,}000 \times 241 \times (70-44)}{(70-0)}$$

$H = 150{,}384{,}000$ Btu, the heat loss for the whole heating season.

This can be converted into fuel units by dividing by the heat value per fuel unit and by the utilization efficiency. For example, assuming 535 Btu per cubic foot of gas at 80% efficiency, the gas consumption per season would be

$$\frac{150{,}384{,}000}{535 \times .80} = 351{,}364 \text{ cu. ft.}$$

However, equation (2) can be further simplified. Substituting equation (5) into equation (2) for t_a,

$$H = \frac{24hd}{(70-t_o)}\left[70-\left(65-\frac{D}{d}\right)\right) \quad \ldots\ldots (6)$$

which reduces to

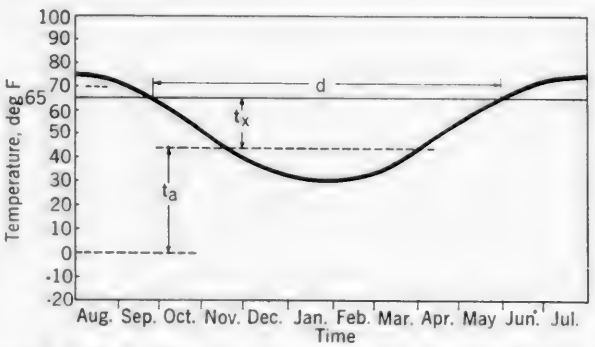


Fig. 4. Normal daily mean temperatures plot in a smooth curve as shown here.

$$H = \frac{24(5d+D)h}{(70-t_o)} \quad \ldots\ldots\ldots\ldots (7)$$

Since t_o is constant for a given city, as are d and D, the unit heat required per degree-day per Btu heat loss at design conditions is

$$\frac{H}{D} = \frac{24(5d+D)}{(70-t_o)D}\,h \quad \ldots\ldots\ldots\ldots (8)$$

and since it is desirable to express the unit figure in terms of *thousands* of Btu heat loss

$$\frac{1000\ H}{D} = \frac{24(5d+D)1000h}{(70-t_o)D} \quad \ldots\ldots\ldots (9)$$

The whole term $\frac{24(5d+D)1000}{(70-t_o)D}$ can be calculated for any given city. Expressed in words, this term, which can be called K, is the unit heat requirement for that locality, in Btu per degree-day per 1000 Btu per hour heat loss at the design condition. The working formula is thus:

$$H = KD\,\frac{h}{1000} \quad \ldots\ldots\ldots\ldots (10)$$

where

H = heat to be supplied, Btu per normal heating season.

h/1000 = heat loss *in thousands of Btu* per hour at design conditions.

D = normal number of degree-days per year,

K = heat to be supplied, Btu per degree-day per 1000 Btu per hour heat loss at design conditions, for the city in question. Note that K is a constant only for a given city or small locality.

Values of K and D for a large number of United States cities are given in the table titled "Data on Normal Heating Season in U. S. Cities," pages 106-114.

Example. The New York residence previously cited, with a calculated heat loss of 70,000 Btu per hour. From the table K for New York City is 424.7 and D is 5050, so that

$$H = 424.7 \times 5050 \times 70$$
$$= 150{,}131{,}450 \text{ Btu per year}$$

Burning 535 Btu per cu. ft. gas at 80% efficiency,

$$\text{Cu. ft. gas required per season} = \frac{150{,}131{,}450}{535 \times .80} =$$
$$357{,}774 \text{ cu. ft.}$$

In cases involving gas or steam, or in any cases where monthly figures are necessary, this table can be used to determine K; then for D use the number of degree-days in that locality for the given month and enter in equation (10). In this case, the answer will be in Btu to be supplied for that month.

Example. For the same residence, what would be the gas required for December?

The number of degree-days in a normal December in New York is 908. Using this in equation (10)

$$H_{Dec} = 424.7 \times 908 \times 70$$
$$H_{Dec} = 26{,}993{,}932 \text{ Btu}$$

and for 535 Btu gas at 80% efficiency

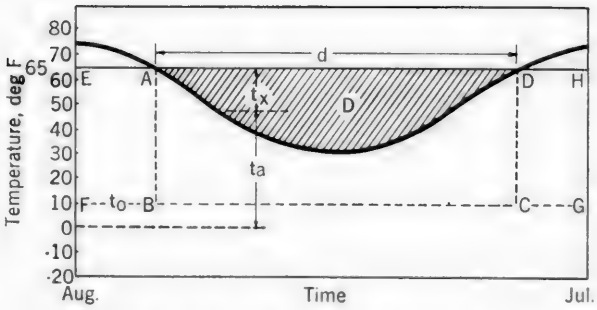


Fig. 5. Normal daily mean temperature curve showing graphically the number of degree-days represented by the shaded area.

$$\text{Cu. ft. gas for Dec.} = \frac{26{,}993{,}932}{535 \times .80} = 63{,}069 \text{ cu ft}$$

Empirical Constants

The term K in equation (10) is Btu required per degree-day per 1000 Btu heat loss at design conditions. Constants of this general type, in different units, are widely used and, in fact, their use dates back to the earliest applications of the degree-day. Among such units which have been used are "cubic feet of gas per square foot of steam radiator per degree-day", "gallons of oil per square foot of steam radiator per degree-day", "pounds of steam per 1000 cubic foot of building volume" and a great many others.

These units were determined empirically and are quite useful when used in the locality in which they were determined. However, in the early days of the degree-day, it was found that fuel constants used in the northeast portion of the country were highly inaccurate in the south and southwest. The reason for this is that the term K is not a constant but varies widely throughout the country, as has been shown. due to the variation in d, D, and t_o.

The exceedingly wide variation in value of K, and which explains why one value of K cannot be used over a wide area, is shown graphically in the accompanying map titled "Unit Heat Requirements per Degree-Day." This map can be used to obtain values of K for cities not appearing in the table. Discretion must be used in using the map, however, for mountainous localities.

The advantage of using K in terms of hourly heat loss at design conditions is that the Btu is the basic unit and the result is easily converted to other units (such as square foot of radiator).

Load Factor

Refer to Fig. 5 which shows design temperature, t_o, which in this case is at +10 deg, t_x, the average altitude of the shaded area, and $t_a = 65 - t_x$.

The Seasonal Load Factor (SLF) of a winter heating plant can be defined as the per-cent of time during the heating season that the heating plant operates. Graphically, in Fig. 5, it is the ratio, expressed in per-cent, of the shaded area to the area of the rectangle ABCD. Since the shaded area has already been shown to be equal to D, the number of degree days during the heating season, and since $AB = 65 - t_o$ and $BC = d$, then

$$SLF = \frac{D}{d(65-t_o)} \times 100 \quad \ldots\ldots\ldots (11)$$

But $D = dt_x$ so that

$$SLF = \frac{dt_x}{d(65-t_o)} = \frac{t_x}{65-t_o} \times 100$$

Annual Load Factor (ALF) of the heating plant is the per-cent of total time over the year that the heating plant operates. Graphically, it is the ratio of the shaded area in Fig. 5 to the area of the rectangle EFGH. Therefore, it can be shown that

$$ALF = \frac{D}{365(65-t_o)} = \frac{dt_x}{365(65-t_o)} \ldots (12)$$

NORMAL DEGREE-DAYS BY MONTHS FOR CANADIAN CITIES

City	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Total
ALBERTA													
Calgary	108	167	432	722	1122	1426	1609	1355	1215	750	480	264	9650
Edmonton	70	167	444	747	1215	1578	1814	1501	1290	780	428	231	10285
Grande Prairie	153‡	156‡	480	812	1218	1649	1841	1456	1339	822	505	285	10716
Medicine Hat	13‡	76‡	267	601	1104	1417	1643	1406	1150	606	301	54	8638
BRITISH COLUMBIA													
Crescent Valley	29‡	58‡	360	698	981	1240	1352	1112	961	624	403	198	8016
Fort Nelson	★	★	474	902	1716	2142	2179	1775	1457	837	459	219	12160
Kamloops	★	★	201	542	882	1166	1336	1072	821	462	211	16	6709
Penticton	18‡	23‡	213	527	813	1073	1184	969	787	507	273	57	6444
Prince George	221‡	206‡	444	741	1068	1504	1615	1305	1091	738	490	264	9687
Prince Rupert	282	229	342	546	702	893	933	804	809	645	521	357	7063
Vancouver	43	65	234	459	657	818	893	736	682	498	326	162	5573
Victoria	155	158	264	446	462	738	815	689	651	504	366	237	5485
MANITOBA													
Churchill	350	391	696	1187	1773	2356	2604	2288	2204	1530	1097	672	17148
The Pas	★	★	483	921	1452	1996	2285	1865	1668	969	521	174	12334
Winnipeg	39†	34	330	744	1302	1829	2111	1775	1531	822	397	78	10992
NEW BRUNSWICK													
Chatham	★	★	258	601	972	1438	1637	1442	1234	828	477	156	9043
Fredericton	★	★	270	598	960	1420	1596	1408	1197	780	434	147	8810
Moncton	33†	56	282	595	936	1373	1528	1392	1190	798	474	180	8837
St. John	124	112	270	558	870	1271	1417	1266	1132	792	505	261	8578
NOVA SCOTIA													
Halifax	12	12	189	499	789	1138	1283	1170	1066	768	493	213	7614
Sydney	★	★	237	527	801	1125	1330	1266	1166	861	583	276	8172
Yarmouth	★	★	258	499	741	1054	1209	1098	1023	756	527	285	7450
ONTARIO													
Fort William	62	155	354	722	1143	1596	1807	1582	1386	888	567	234	10496
Hamilton	★	★	108	471	816	1178	1305	1187	1063	651	322	6	7107
Kapuskasing	★	★	417	812	1290	1820	2068	1753	1593	1023	598	225	11599
Kenora	★	★	333	756	1236	1779	2018	1702	1435	861	453	105	10678
London	27†	45†	126	508	843	1200	1336	1240	1073	642	307	105	7452
North Bay	82‡	129‡	264	694	1017	1528	1658	1492	1280	813	434	132	9523
Ottawa	26†	53†	204	595	984	1494	1646	1459	1256	726	310	91	8844
Porquis Junction	125‡	112‡	396	809	1266	1786	2052	1764	1550	972	558	192	11573
Toronto	16	35	168	504	817	1155	1304	1206	1072	669	341	86	7374
Windsor	13†	27†	54	425	795	1172	1283	1148	995	582	251	73	6719
PRINCE EDWARD ISLE													
Charlottetown	36†	50†	222	539	858	1246	1463	1338	1203	858	536	213	8562
QUEBEC													
Megantic	★	★	318	670	1044	1507	1655	1495	1321	870	496	174	9550
Montreal	12†	37†	180	561	948	1407	1552	1460	1265	715	325	88	8559
Quebec	32†	43	276	651	1050	1534	1696	1481	1311	849	428	102	9451
St. Felicien	★	★	378	750	1140	1773	2024	1702	1442	960	530	204	10903
SASKATCHEWAN													
North Battleford	★	★	390	760	1296	1779	2049	1686	1476	780	391	147	10754
Regina	38†	54†	408	794	1355	1779	2037	1764	1504	816	434	144	11127
Saskatoon	44†	68	396	781	1305	1767	2027	1635	1445	725	397	138	10728
Swift Current	★	★	348	707	1155	1531	1776	1504	1302	714	397	132	9566
YUKON TERRITORY													
Dawson	167	322	687	1209	1908	2440	2666	2159	1879	1092	580	246	15355

† Average of 1945, 1946 and 1947 actual degree-days. ‡ Average of 1945 and 1946 actual degree-days.
★ No data available.

The number of operating hours, or OH, that an intermittent or on-off heating plant operates during a normal year is thus

$$OH = ALF \times 24 \times 365 \quad \ldots\ldots\ldots (13)$$

It is useful to know the number of hours of operation of a heating plant to determine the electrical consumption of burner motors, pumps, and similar equipment.

Tables and Maps

On subsequent pages, maps and tables are presented as follows:

Canadian and Alaskan Data. Pages 94-95. Tables of normal degree-day figures by months for Alaska are based on U. S. Weather Bureau data; those for the Dominion of Canada are by the Meteorological Division of the Department of Transport of the Dominion. A map of these combined data is presented on page 97.

U. S. Normal Degree Days. Page 96. U. S. normal degree-day tables appeared in the March, 1954, issue of AIR CONDITIONING, HEATING AND VENTILATING. A new degree-day map appears in this present issue as the first of a new series of maps.

Winter Design Temperatures. Page 98. A map of winter design temperatures (t_o) for the U. S., for use in solving equation (9).

Date Heating Season Begins and Ends. Pages 99-100. A map of the beginning date, and one of the ending date, in a normal year.

Days per Heating Season. Page 101. A map of the normal number of the days between the beginning and end of the heating season.

Average Heating Season Temperature. Page 102. A map of the average outside temperature (t_a) during a normal heating season.

Unit Heat Requirements. Page 103. The Btu required per degree-day per 1000 Btu per hour heat loss is mapped. This figure, K, is for use in equation (10).

Number of Hours a Heating Plant Operates. Page 104. A map showing the number of hours which an intermittent automatic heating plant operates in a normal year.

Seasonal Load Factor. Page 105. A map of the per-cent of the heating season a heating plant operates.

Data on Normal Heating Season. Pages 106-114. A comprehensive table giving certain normal heating season data for 413 specific U. S. localties, and including the value of K for use in equation (10).

Limitations

The foregoing method of predicting fuel consumption and the supplementary data derived from this method are subject to limitations as follows:

(1) By definition, the method applies to spaces heated to 70 deg during daytime and evening hours, and will not apply to spaces heated to other temperatures, such as industrial buildings, for example.

(2) The data apply to a normal year and are subject to variations from year to year as the number of degree-days varies.

(3) Since the factor K is based on the design heat loss, the results in terms of fuel can be no more accurate than the heat loss calculation. If the heat losses are figured liberally, on the conservative side, the fuel figure will likewise be too liberal.

(4) Since heat gains are not ordinarily calculated in winter heat loss computations indicated by this method will be too high by the amount of heat gain. Heat gains in winter include those from (1) the chimney, (2) cooking and bathing, (3) body heat loss, (4) appliances, and (5), perhaps most important, solar heat. These added together can amount to as much as 25% of the heat loss and, if they are ignored, the fuel consumption can be estimated too liberally by a corresponding amount.

(5) The method is based on an outside design temperature (t_o) as listed in the table. If any other design temperature is used, refigure K by using equation (9). This is important because of increasing use of design temperatures based on different climatic frequencies.

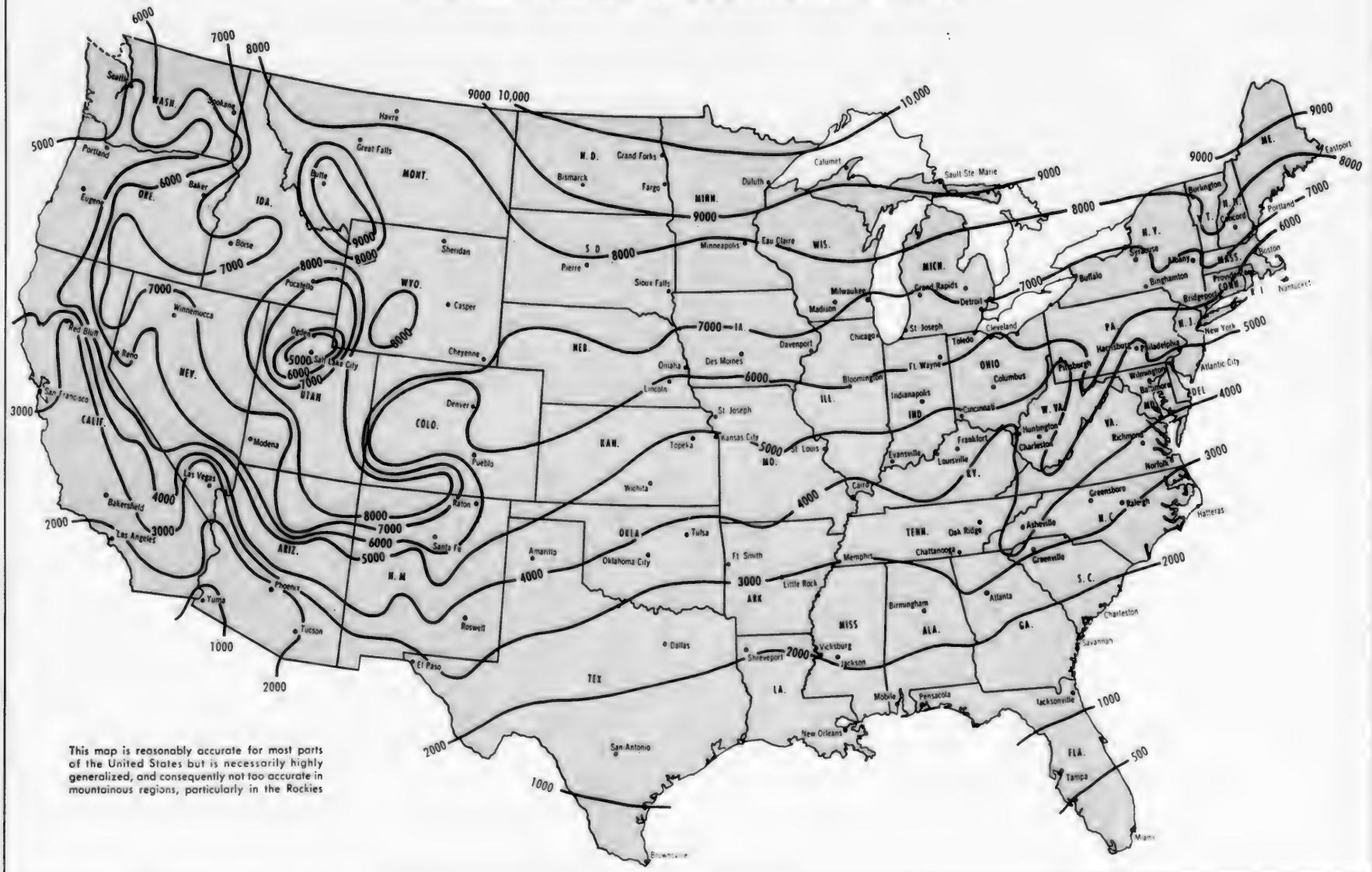
(6) The calculated fuel consumption, since it is based on space heating only, does *not* include the fuel for service hot water.

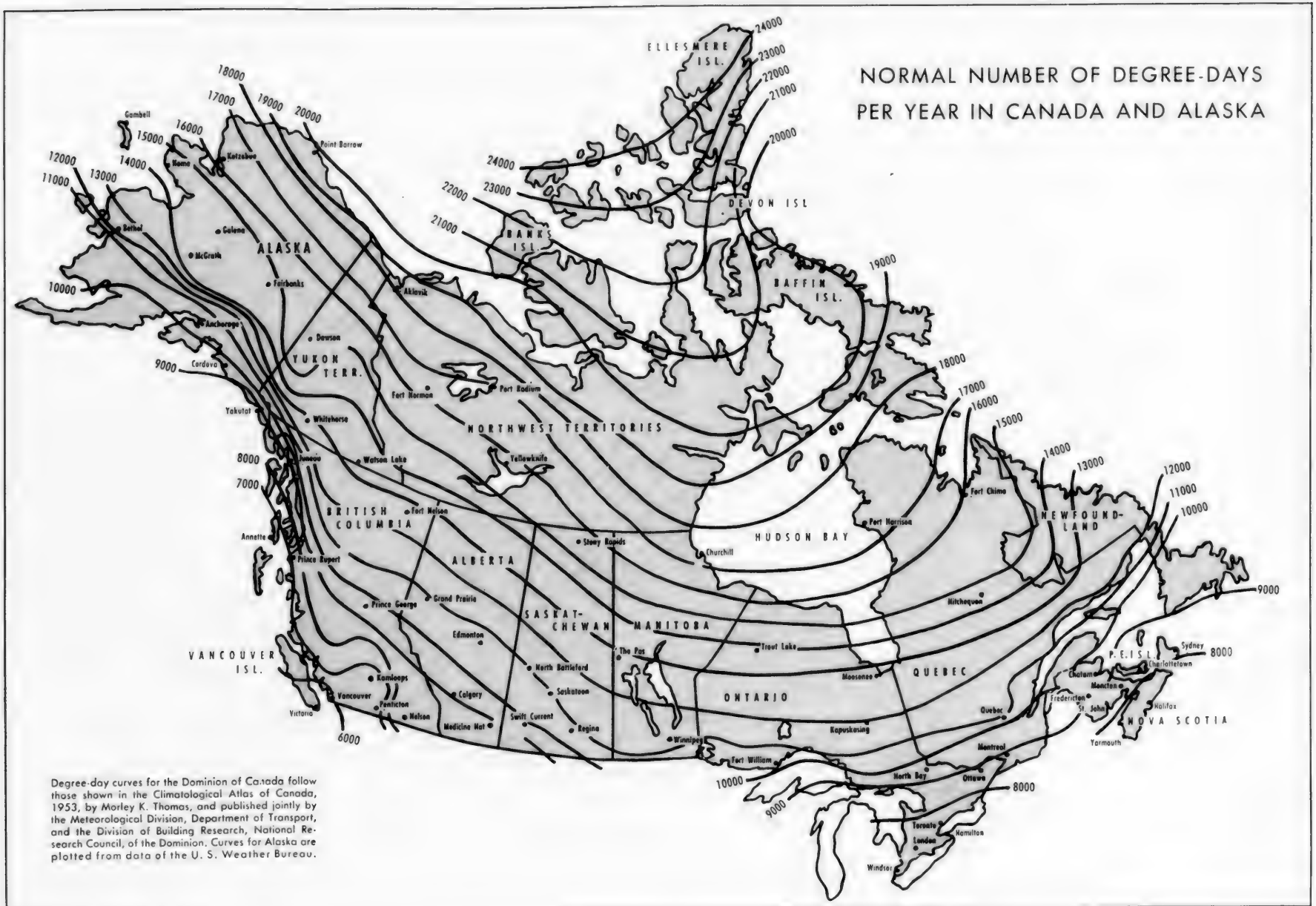
(7) Note that equation (10) does *not* include heating plant efficiency; this must be allowed for separately, as shown in the examples.

NORMAL DEGREE-DAYS BY MONTHS FOR ALASKAN CITIES

City	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Total
Anchorage	239	291	510	899	1281	1587	1612	1299	1246	888	598	339	10789
Annette	262	217	357	561	729	896	942	809	384	672	496	321	7096
Barrow	784	825	1032	1485	1929	2237	2483	2321	2477	1956	1432	933	19994
Bethel	326	381	591	1029	1440	1792	1804	1565	1659	1146	775	372	12880
Cordova	363	360	510	750	1017	1190	1240	1089	1082	858	685	471	9615
Fairbanks	149	296	612	1163	1857	2297	2319	1907	1736	1083	546	193	14158
Galena	171	311	624	1175	1818	2235	2303	1887	1894	1224	670	226	14538
Gambell	642	598	747	1042	1254	1655	1854	1767	1845	1425	1135	810	14474
Juneau (A)	319	335	480	716	957	1159	1203	1056	998	765	558	342	8888
Juneau (C)	279	282	426	651	864	1066	1101	983	949	738	533	315	8187
Kotzebue	384	443	723	1225	1725	2130	2220	1952	2065	1536	1097	651	16151
McGrath	206	357	630	1159	1785	2241	2285	1809	1789	1170	676	283	14390
Nome	477	493	690	1085	1446	1776	1841	1660	1752	1320	970	576	14086
Northway	186	350	675	1262	2016	2474	2545	2083	1801	1176	626	312	15506
St. Paul Island (A)	592	527	591	803	936	1107	1197	1154	1256	1047	924	705	10839
Yakutat	381	378	498	722	939	1153	1194	1036	1060	855	673	465	9354

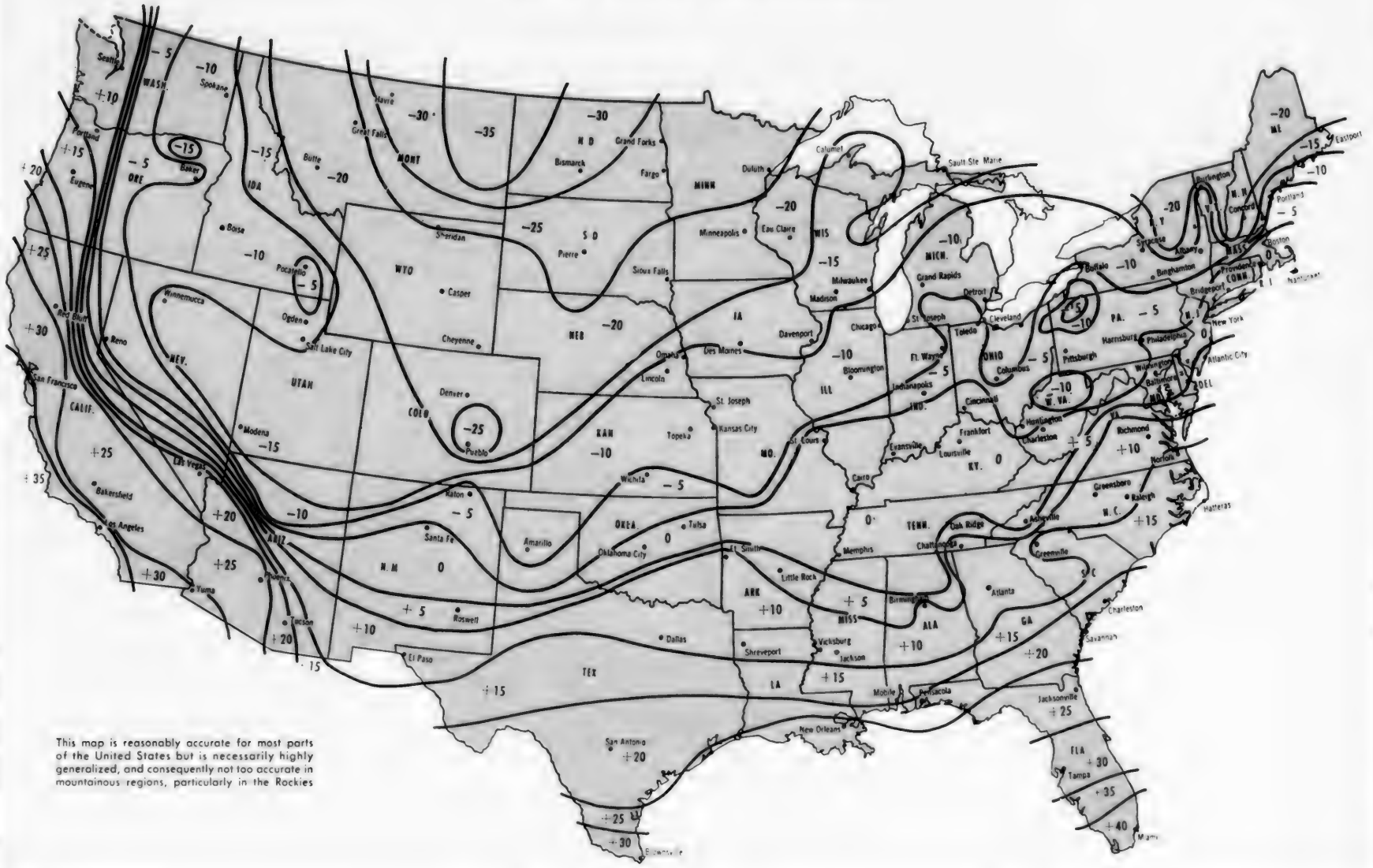
NORMAL NUMBER OF DEGREE-DAYS PER YEAR

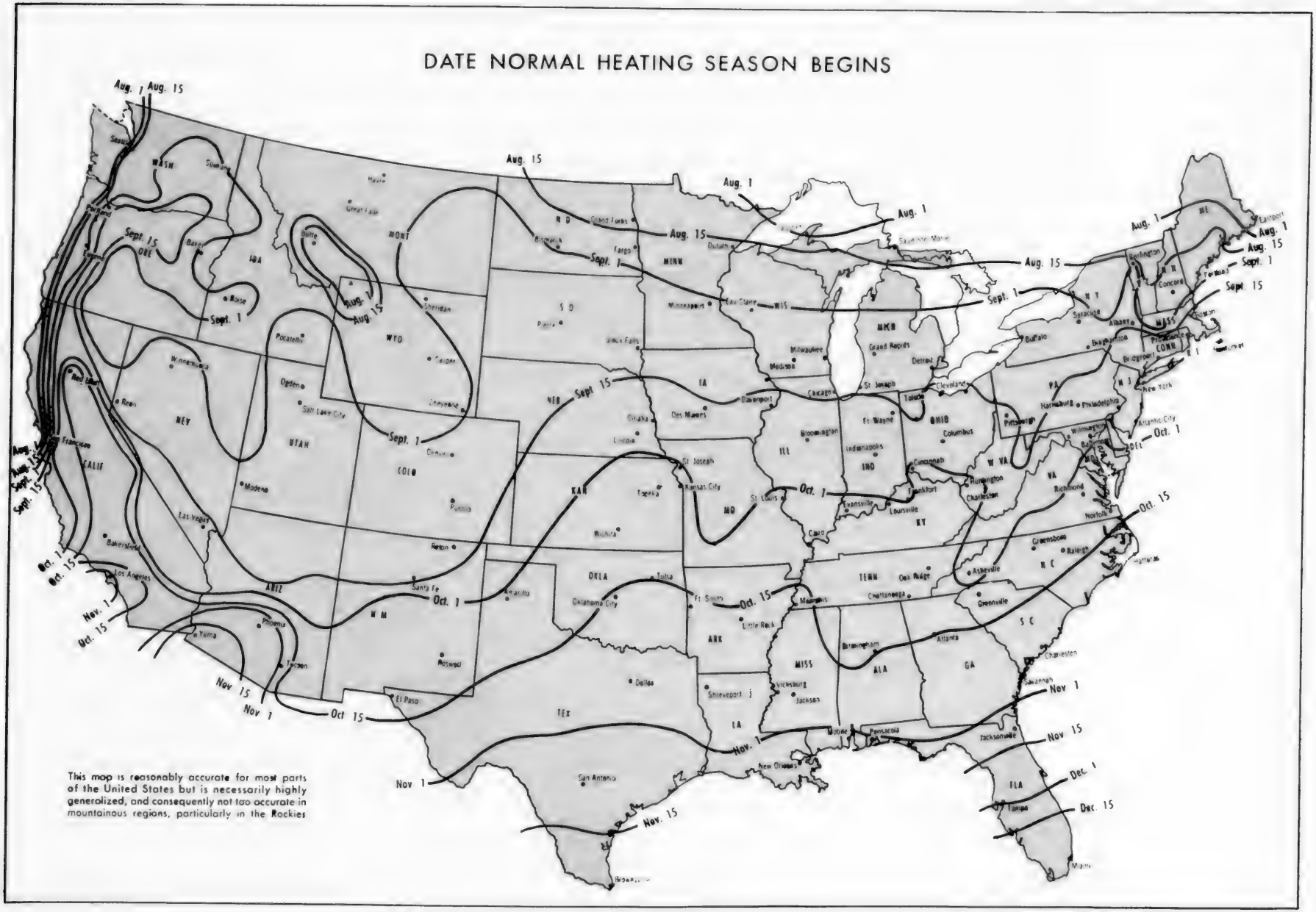




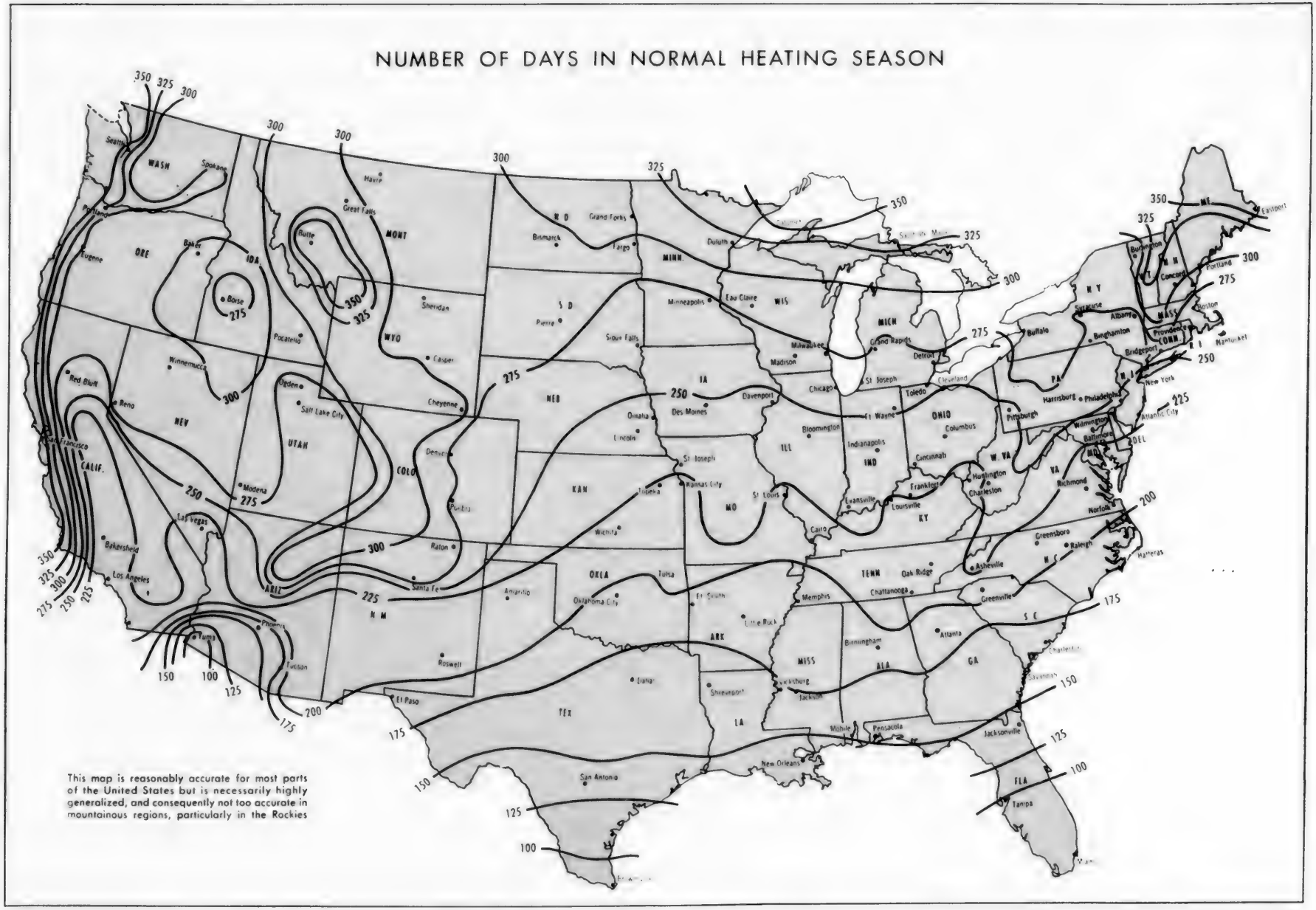
Degree-day curves for the Dominion of Canada follow those shown in the Climatological Atlas of Canada, 1953, by Morley K. Thomas, and published jointly by the Meteorological Division, Department of Transport, and the Division of Building Research, National Research Council, of the Dominion. Curves for Alaska are plotted from data of the U. S. Weather Bureau.

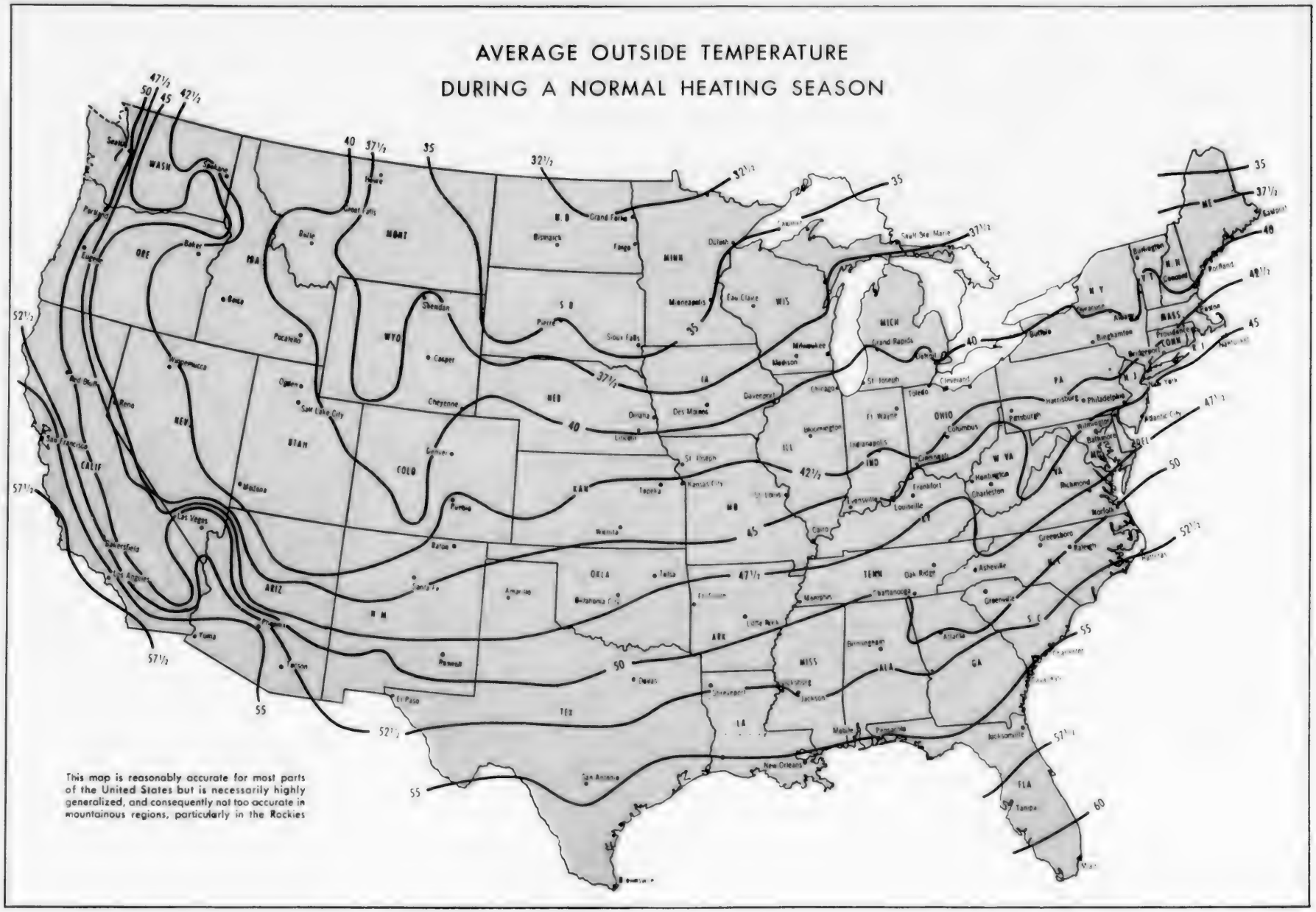
WINTER DESIGN TEMPERATURES

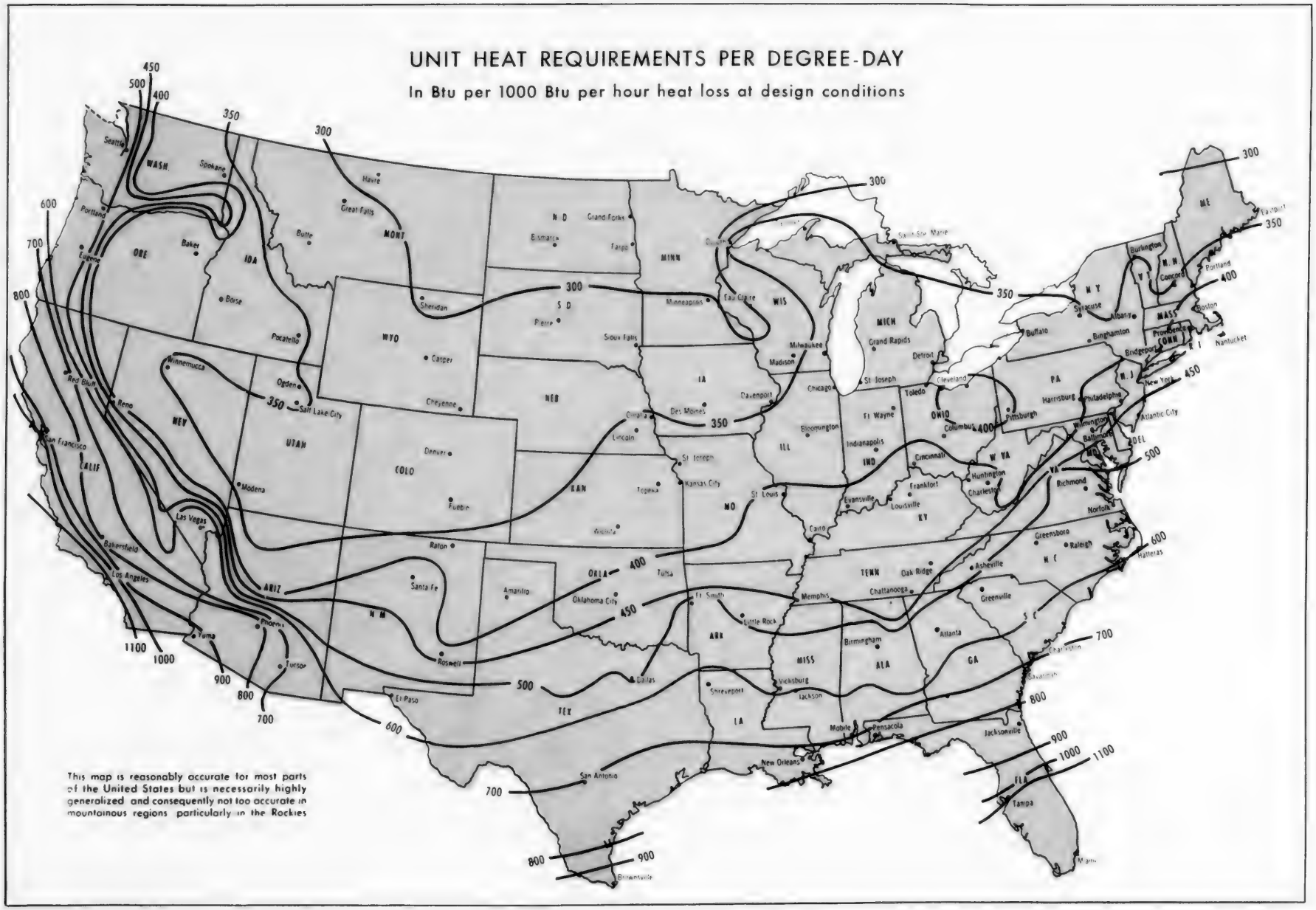

This map is reasonably accurate for most parts of the United States but is necessarily highly generalized, and consequently not too accurate in mountainous regions, particularly in the Rockies


DATE NORMAL HEATING SEASON BEGINS
Aug. 1
Aug. 15
Sept. 1
Sept. 15
Oct. 1
Oct. 15
Nov. 1
Nov. 15
Dec. 1
Dec. 15
This map is reasonably accurate for most parts of the United States but is necessarily highly generalized, and consequently not too accurate in mountainous regions, particularly in the Rockies

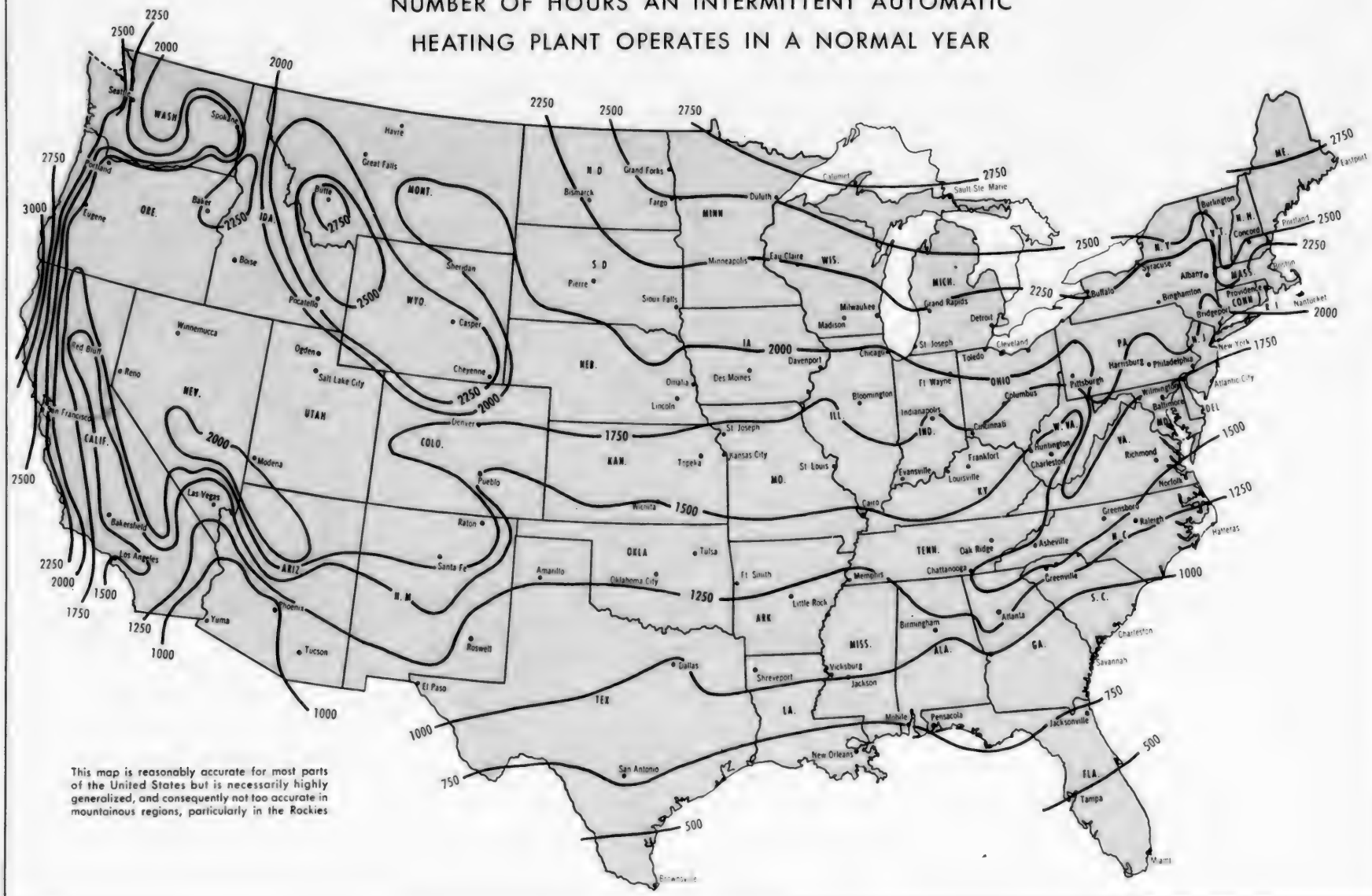
DATE NORMAL HEATING SEASON ENDS
Jul. 1
Jun. 15
Jun. 15
Jul. 1
Jul. 1
Jul. 1
Jul. 1
Jul. 15
Jul. 1
Jun. 15
Jun. 1
Jun. 15
Jun. 1
Jun. 15
Jul. 1
Jun. 15
Jun. 1
May 15
May 1
Apr. 1
Apr. 15
Mar. 15
Mar. 15
Apr. 1
Apr. 15
May 15
May 1
Apr. 15
Apr. 1
Mar. 15
Mar. 1
Feb. 15
May 15
May 1
Apr. 15
Apr. 1
Mar. 15
Mar. 1
Feb. 15
Feb. 1
Jun. 1
Seattle
Portland
Spokane
Eugene
Baker
Boise
Pocatello
Winnemucca
Red Bluff
Reno
San Francisco
Modena
Bakersfield
Los Angeles
Las Vegas
Yuma
Phoenix
Tucson
Salt Lake City
Sheridan
Casper
Cheyenne
Denver
Pueblo
Raton
Santa Fe
Roswell
El Paso
Great Falls
Butte
Bismarck
Grand Forks
Minot
Duluth
Minneapolis
Eau Claire
Pierre
Sioux Falls
Milwaukee
Madison
Davenport
Omaha
Lincoln
Des Moines
Kansas City
St. Joseph
Topeka
Wichita
Amarillo
Oklahoma City
Tulsa
Dallas
Shreveport
Vicksburg
Jackson
New Orleans
San Antonio
Chicago
St. Louis
Cairo
Evansville
Indianapolis
Bloomington
Ft. Wayne
Louisville
Frankfort
Cincinnati
Columbus
Toledo
Cleveland
Detroit
Grand Rapids
Buffalo
Pittsburgh
Huntington
Charleston
Oak Ridge
Chattanooga
Memphis
Ft. Smith
Little Rock
Birmingham
Atlanta
Mobile
Pensacola
Jacksonville
Tampa
Miami
Greenville
Asheville
Greensboro
Raleigh
Norfolk
Richmond
Wilmington
Baltimore
Philadelphia
Harrisburg
Atlantic City
New York
Bridgeport
Providence
Nantucket
Boston
Concord
Portland
Burlington
Albany
Syracuse
Binghamton
Charleston
Savannah
Hatteras
This map is reasonably accurate for most parts of the United States but is necessarily highly generalized, and consequently not too accurate in mountainous regions, particularly in the Rockies


NUMBER OF DAYS IN NORMAL HEATING SEASON
This map is reasonably accurate for most parts of the United States but is necessarily highly generalized, and consequently not too accurate in mountainous regions, particularly in the Rockies

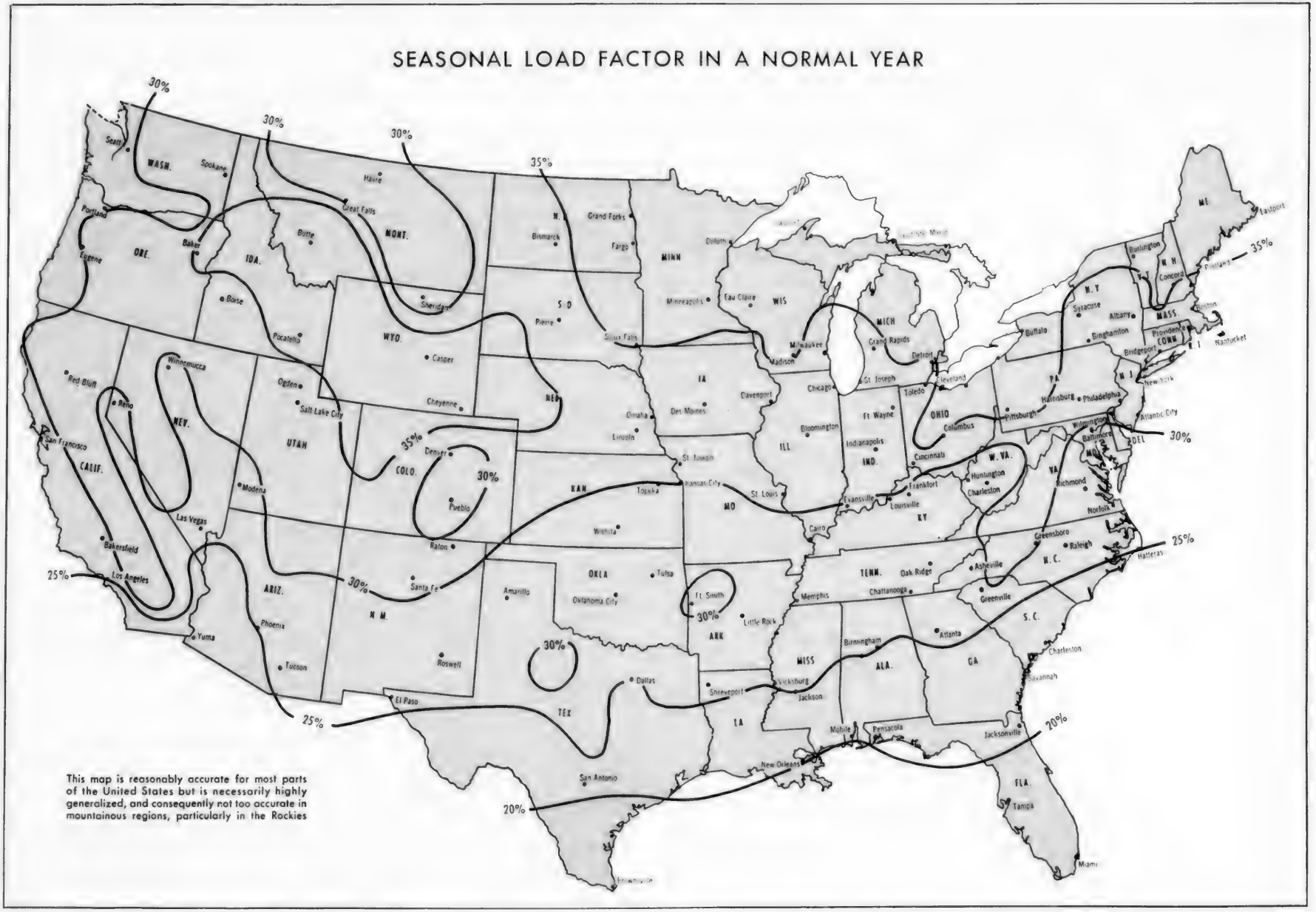

AVERAGE OUTSIDE TEMPERATURE
DURING A NORMAL HEATING SEASON
This map is reasonably accurate for most parts of the United States but is necessarily highly generalized, and consequently not too accurate in mountainous regions, particularly in the Rockies


UNIT HEAT REQUIREMENTS PER DEGREE-DAY
In Btu per 1000 Btu per hour heat loss at design conditions
This map is reasonably accurate for most parts of the United States but is necessarily highly generalized and consequently not too accurate in mountainous regions particularly in the Rockies
Seattle
Portland
Spokane
Eugene
Baker
Havre
Great Falls
Butte
Borse
Pocatello
Sheridan
Casper
Cheyenne
Winnemucca
Red Bluff
Reno
Ogden
Salt Lake City
Modena
Denver
Pueblo
Raton
Santa Fe
Las Vegas
Bakersfield
Los Angeles
Yuma
Phoenix
Tucson
Roswell
Amarillo
Dallas
El Paso
San Antonio
Brownsville
New Orleans
Grand Forks
Bismarck
Fargo
Minneapolis
Duluth
Sault Ste Marie
Eau Claire
Pierre
Sioux Falls
Madison
Milwaukee
Chicago
Davenport
Des Moines
Omaha
Lincoln
St Joseph
Kansas City
Topeka
St Louis
Cairo
Wichita
Oklahoma City
Tulsa
Ft Smith
Little Rock
Memphis
Vicksburg
Jackson
Shreveport
Mobile
Pensacola
Jacksonville
Tampa
Miami
Atlanta
Birmingham
Chattanooga
Oak Ridge
Asheville
Greenville
Charleston
Savannah
Raleigh
Greensboro
Norfolk
Hatteras
Richmond
Lynchburg
Roanoke
Bristol
Knoxville
Nashville
Louisville
Evansville
Indianapolis
Bloomington
Ft Wayne
Toledo
Cleveland
Detroit
Grand Rapids
St Joseph
Buffalo
Syracuse
Albany
Binghamton
Harrisburg
Philadelphia
Pittsburgh
Columbus
Cincinnati
Huntington
Charleston
Wilmington
Baltimore
Atlantic City
New York
Bridgeport
Providence
Boston
Nantucket
Portland
Concord
Burlington
Vermont
Maine
Augusta
Montana
North Dakota
South Dakota
Wyoming
Nebraska
Colorado
Utah
Nevada
California
Arizona
New Mexico
Oklahoma
Texas
Kansas
Missouri
Illinois
Indiana
Ohio
West Virginia
Kentucky
Tennessee
Mississippi
Alabama
Georgia
South Carolina
North Carolina
Virginia
Maryland
Delaware
New Jersey
Pennsylvania
New York
Connecticut
Rhode Island
Massachusetts
Vermont
New Hampshire
Maine
Michigan
Wisconsin
Minnesota
Iowa
Arkansas
Louisiana
Florida
300
350
400
450
500
600
700
800
900
1000
1100

NUMBER OF HOURS AN INTERMITTENT AUTOMATIC HEATING PLANT OPERATES IN A NORMAL YEAR



This map is reasonably accurate for most parts of the United States but is necessarily highly generalized, and consequently not too accurate in mountainous regions, particularly in the Rockies


SEASONAL LOAD FACTOR IN A NORMAL YEAR
30%
30%
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WASH.
ORE.
IDA.
MONT.
WYO.
COLO.
NEV.
UTAH
CALIF.
ARIZ.
N. M.
N. D.
S. D.
NEB.
KAN.
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WIS
ILL
MICH
IND.
OHIO
KY
TENN.
MISS
ALA.
GA
FLA.
S. C.
N. C.
VA
W. VA.
PA.
N. Y.
MD.
DEL.
N. J.
CONN.
R. I.
MASS.
VT.
N. H.
ME.
Seattle
Spokane
Portland
Eugene
Baker
Havre
Great Falls
Butte
Boise
Sheridan
Pocatello
Casper
Red Bluff
Winnemucca
Reno
Ogden
Salt Lake City
Cheyenne
San Francisco
Denver
Modena
Las Vegas
Pueblo
Bakersfield
Los Angeles
Raton
Santa Fe
Yuma
Phoenix
Tucson
Roswell
Amarillo
Oklahoma City
Tulsa
Dallas
El Paso
San Antonio
Houston
Grand Forks
Bismarck
Fargo
Pierre
Sioux Falls
Minneapolis
Duluth
Eau Claire
Omaha
Lincoln
Des Moines
Davenport
Madison
Milwaukee
Chicago
Grand Rapids
Detroit
Toledo
Cleveland
St. Joseph
Kansas City
Topeka
Wichita
St. Louis
Cairo
Bloomington
Indianapolis
Ft. Wayne
Columbus
Cincinnati
Evansville
Louisville
Frankfort
Huntington
Charleston
Pittsburgh
Buffalo
Syracuse
Albany
Binghamton
Harrisburg
Philadelphia
Wilmington
Baltimore
Atlantic City
New York
Bridgeport
Providence
Boston
Nantucket
Burlington
Concord
Portland
Eastport
Richmond
Norfolk
Greensboro
Raleigh
Asheville
Hatteras
Oak Ridge
Chattanooga
Memphis
Ft. Smith
Little Rock
Greenville
Atlanta
Birmingham
Charleston
Savannah
Jackson
Vicksburg
Shreveport
Mobile
Pensacola
Jacksonville
New Orleans
Tampa
Miami
This map is reasonably accurate for most parts of the United States but is necessarily highly generalized, and consequently not too accurate in mountainous regions, particularly in the Rockies

DATA ON NORMAL HEATING SEASON IN U. S. CITIES

City	Average Date Season Begins	Average Date Season Ends	Days per Season	Average Temp., Deg. F.	K, Heat Required, Btu	No. of Degree-Days	Outside Design Temp., Deg. F
ALABAMA							
Anniston-A	Oct 15	Apr 24	192	50.3	494.6	2820	5
Birmingham-A	Oct 15	Apr 25	193	50.6	538.8	2780	10
Gadsden†	Oct 10	May 1	204	50.8	463.4	2903	0
Mobile-A	Oct 29	Apr 5	159	54.9	651.9	1612	15
Mobile-C	Nov 2	Apr 1	151	54.9	651.9	1529	15
Montgomery-A	Oct 21	Apr 14	176	52.9	564.8	2137	10
Montgomery-C	Oct 25	Apr 10	168	53.4	572.0	1954	10
Tuscaloosa†	Oct 14	Apr 22	191	51.8	508.5	2529	5
ARIZONA							
Flagstaff-A	Aug 12	Jul 5	328	42.1	365.4	7525	−10
Nogales†	Oct 10	May 11	214	53.2	684.2	2516	20
Phoenix-A	Oct 30	Apr 3	155	54.0	808.1	1698	25
Phoenix-C	Nov 5	Apr 2	149	55.0	799.5	1492	25
Prescott-A	Sept 29	May 29	243	46.3	380.4	4533	−10
Tucson-A	Oct 29	Apr 11	165	54.2	781.3	1776	25
Winslow-A	Sept 29	May 25	239	45.3	370.3	4702	−10
Yuma-A	Nov 15	Mar 7	113	56.6	956.5	951	30
ARKANSAS							
Fort Smith-A	Oct 16	Apr 20	187	48.0	517.3	3188	10
Little Rock-A	Oct 17	Apr 21	187	49.1	484.9	2982	5
Texarkana-A	Oct 24	Apr 12	171	51.2	544.8	2362	10
CALIFORNIA							
Bakersfield-A	Oct 23	Apr 21	181	53.3	761.5	2115	25
Beaumont-C	Oct 12	May 29	230	52.7	843.0	2840	30
Bishop-A	Sept 29	May 23	239	47.3	615.8	4222	20
Burbank-A	Oct 20	May 18	211	56.4	—	1808	—
Eureka-C	—	—	365	52.3	837.5	4632	30
Fresno-A	Oct 16	Apr 25	192	51.8	735.5	2532	25
Independence†	Sept 25	May 23	241	49.1	—	3832	—
Los Angeles-A	Oct 11	Jun 13	246	56.8	1103.9	2015	35
Los Angeles-C	Nov 2	May 10	190	57.4	1134.8	1451	35
Montague†	Sept 6	Jun 18	286	46.0	—	5423	0
Mount Shasta-C	Aug 28	Jun 29	306	45.7	—	5913	—
Oakland-A	—	—	365	56.3	948.0	3163	30
Pasadena†	Oct 7	Jun 8	245	56.6	—	2067	25
Red Bluff-A	Oct 19	May 3	197	52.1	739.7	2546	25
Sacramento-A	Oct 13	May 16	216	51.9	829.8	2822	30
Sacramento-C	Oct 16	May 14	211	52.7	843.5	2600	30
San Diego-A	Oct 22	Jun 2	224	58.0	1173.9	1574	35
San Francisco-A	—	—	365	55.6	1053.1	3421	35
San Francisco-C	—	—	365	56.6	1095.7	3069	35
San Jose-C	Oct 7	Jun 7	244	55.1	803.0	2410	25
Santa Maria-A	—	—	365	57.0	1112.2	2934	35
COLORADO							
Alamosa-A	Aug 2	Jul 10	343	39.8	—	8659	—
Boulder†	Sept 9	Jun 12	277	45.1	315.9	5535	−25
Colorado Springs-A	Sept 8	Jun 10	276	41.4	308.5	6254	−25
Denver-A	Sept 12	Jun 9	271	42.4	325.6	6132	−20
Denver-C	Sept 15	Jun 7	266	43.7	329.1	5673	−20
Grand Junction-A	Sept 25	May 23	241	41.0	341.1	5796	−15
Pueblo-A	Sept 17	May 31	257	42.8	309.6	5709	−25

City	Average Date Season Begins	Average Date Season Ends	Days per Season	Average Temp., Deg. F.	K, Heat Required, Btu	No. of Degree-Days	Outside Design Temp., Deg. F
CONNECTICUT							
Bridgeport–A	Sept 19	Jun 5	260	42.3	390.6	5896	−5
Hartford–A	Sept 12	Jun 2	264	41.7	388.7	6139	−5
New Haven–A	Sept 14	Jun 8	268	42.5	391.0	6026	−5
DELAWARE							
Dover†	Sept 25	May 20	238	45.7	431.8	4591	0
Milford†	Sept 28	May 17	232	46.5	435.7	4303	0
Wilmington–A	Sept 27	May 19	235	44.1	424.9	4910	0
DISTRICT OF COLUMBIA							
Washington–A	Oct 2	May 14	225	45.7	432.0	4333	0
Washington–C	Oct 2	May 12	223	45.9	432.7	4258	0
Silver Hill Obs.	Sept 28	May 17	232	45.4	430.6	4539	0
FLORIDA							
Apalachicola–C	Nov 4	Apr 1	149	56.2	837.2	1307	25
Daytona Beach–A	Nov 19	Mar 20	122	57.9	—	868	—
Jacksonville–A	Nov 5	Mar 25	141	56.2	835.7	1243	25
Jacksonville–C	Nov 10	Mar 21	132	56.6	849.5	1113	25
Miami–C	Dec 4	Mar 13	100	63.3	—	173	35
Orlando–A	Nov 28	May 11	165	61.1	1555.9	650	35
Pensacola–C	Nov 3	Apr 2	151	55.5	732.4	1435	20
Tallahassee–A	Oct 27	Apr 1	157	55.3	809.0	1519	25
Tampa–A	Dec 1	Mar 3	93	57.8	1014.0	674	30
GEORGIA							
Albany–A	Oct 28	Apr 5	160	55.0	—	1763	—
Athens–A	Oct 15	Apr 23	191	50.3	536.3	2800	10
Atlanta–A	Oct 15	Apr 25	193	50.4	536.7	2826	10
Atlanta–C	Oct 14	Apr 25	194	50.5	538.0	2811	10
Augusta–A	Oct 23	Apr 12	172	52.6	560.8	2138	10
Columbus–A	Oct 20	Apr 17	180	51.7	550.3	2396	10
Macon–A	Oct 23	Apr 9	169	52.9	616.1	2049	15
Rome–A	Oct 12	Apr 28	199	49.2	526.8	3138	10
Savannah–A	Oct 28	Apr 9	164	54.6	710.4	1710	20
Valdosta–A	Oct 30	Apr 1	154	55.1	—	1525	—
IDAHO							
Boise–A	Sept 9	Jun 12	277	43.7	370.5	5890	−10
Lewiston–A	Sept 13	Jun 8	269	44.6	459.6	5483	5
Pocatello–A	Sept 4	Jun 20	290	40.9	386.4	6976	−5
Salmon	Aug 24	Jun 26	307	39.2	—	7922	—
ILLINOIS							
Aurora†	Sept 10	Jun 2	266	40.0	359.9	6661	−10
Bloomington†	Sept 22	May 21	242	41.5	363.8	5693	−10
Cairo–C	Oct 11	Apr 29	201	46.3	434.4	3756	0
Chicago–A	Sept 21	May 29	251	39.9	359.8	6310	−10
Danville†	Sept 23	May 17	237	42.3	390.3	5391	−5
Decatur†	Sept 22	May 21	242	42.3	366.1	5485	−10
Joliet–A	Sept 16	May 30	257	39.4	358.5	6578	−10
Moline–A	Sept 20	May 25	248	39.3	358.5	6364	−10
Peoria–A	Sept 22	May 27	248	40.5	361.3	6087	−10
Rockford†	Sept 10	Jun 4	268	39.5	358.8	6847	−10
Springfield–A	Sept 24	May 22	241	41.4	366.0	5693	−10
Springfield–C	Oct 1	May 16	228	42.1	365.4	5225	−10
Urbana†	Sept 17	May 27	253	42.1	365.4	5805	−10

City	Average Date Season Begins	Average Date Season Ends	Days per Season	Average Temp., Deg. F.	K, Heat Required, Btu	No. of Degree-Days	Outside Design Temp., Deg. F
INDIANA							
Evansville–A	Oct 4	Jun 15	255	47.9	443.0	4360	0
Fort Wayne–A	Sept 18	May 30	255	40.3	360.9	6287	−10
Indianapolis–A	Sept 25	May 24	242	41.8	364.8	5611	−5
Indianapolis–C	Oct 2	May 18	229	42.6	366.9	5134	−5
South Bend–A	Sept 18	Jun 1	257	39.6	383.0	6524	−10
Terre Haute–A	Sept 28	May 20	235	42.2	390.0	5366	−5
IOWA							
Burlington–A	Sept 23	May 23	243	39.9	359.8	6101	−10
Charles City–C	Sept 10	May 31	264	36.6	—	7504	—
Davenport–C	Sept 24	May 21	240	39.6	338.0	6091	−15
Des Moines–A	Sept 22	May 26	247	38.9	336.6	6446	−15
Des Moines–C	Sept 23	May 23	243	39.2	337.2	6274	−15
Dubuque–A	Sept 10	Jun 4	268	37.9	315.8	7271	−20
Marshalltown†	Sept 12	Jun 1	263	39.0	336.6	6853	−15
Sioux City–A	Sept 16	May 26	253	37.3	314.7	7012	−20
KANSAS							
Concordia–C	Oct 2	May 19	230	41.9	364.8	5323	−10
Dodge City–A	Oct 2	May 20	231	43.1	368.4	5058	−10
Goodland–A	Sept 16	Jun 3	261	40.6	—	6367	—
Salina†	Sept 29	May 18	232	43.6	370.0	4969	−10
Topeka–A	Sept 30	May 18	231	42.5	366.6	5209	−10
Topeka–C	Oct 4	May 13	222	42.8	367.8	4919	−10
Wichita–A	Oct 7	May 14	220	44.2	372.3	4571	−10
KENTUCKY							
Bowling Green–A	Oct 4	May 16	225	46.0	433.0	4279	0
Frankfort†	Sept 27	May 13	229	46.6	436.3	4211	0
Lexington–A	Oct 1	May 21	233	43.6	423.1	4979	0
Louisville–A	Oct 3	May 12	222	45.0	428.6	4439	0
Louisville–C	Oct 6	May 10	217	45.3	430.0	4279	0
LOUISIANA							
Baton Rouge–A	Oct 30	Apr 4	157	54.8	716.2	1595	20
New Orleans–A	Nov 5	Mar 29	145	55.9	744.0	1317	20
New Orleans–C	Nov 10	Mar 24	135	56.3	755.6	1175	20
Shreveport–A	Oct 26	Apr 6	163	52.0	710.0	2117	20
MAINE							
Bar Harbor†	Aug 10	Jun 15	310	40.4	360.9	7643	−10
Caribou–A	Aug 3	Jul 12	344	35.4	—	10173	—
Eastport–C	—	—	365	42.4	366.3	8246	−10
Orono†	Aug 24	Jun 27	308	39.3	341.4	7934	−15
Portland–A	Aug 27	Jun 25	303	39.7	383.0	7681	−5
MARYLAND							
Annapolis†	Sept 24	May 17	236	46.0	466.3	4483	5
Baltimore–A	Sept 28	May 19	234	45.3	430.0	4611	0
Baltimore–C	Sept 8	May 13	248	48.1	440.0	4203	0
Cambridge†	Oct 1	May 13	225	46.1	466.9	4245	5
Frederick–A	Sept 29	May 16	230	43.9	395.8	4854	−5
MASSACHUSETTS							
Boston–A	Sept 17	Jun 5	262	42.9	420.3	5791	0
Fitchburg†	Sept 6	Jun 16	284	41.7	416.4	6632	0
Nantucket–A	Sept 6	Jun 29	297	44.5	426.1	6102	0
Pittsfield–A	Aug 24	Jun 20	301	39.4	358.8	7694	−10

City	Average Date Season Begins	Average Date Season Ends	Days per Season	Average Temp., Deg. F.	K, Heat Required, Btu	No. of Degree-Days	Outside Design Temp., Deg. F
MICHIGAN							
Alpena–C	Aug 25	Jun 25	305	38.5	356.8	8073	−10
Ann Arbor†	Sept 6	Jun 8	276	40.1	384.2	6877	−5
Calumet†	—	—	365	39.5	337.8	9297	−15
Detroit–A	Sept 17	Jun 2	259	40.3	360.6	6404	−10
Escanaba–C	Aug 22	Jun 27	310	37.1	332.9	8657	−15
Flint†	Sept 1	Jun 13	286	39.9	359.8	7179	−10
Grand Haven†	Aug 31	Jun 19	293	41.4	—	6915	—
Grand Rapids–A	Sept 9	Jun 6	271	38.9	357.6	7075	−10
Grand Rapids–C	Sept 16	Jun 2	260	40.1	360.3	6474	−10
Houghton†	Aug 9	Jul 6	332	38.0	—	8964	—
Kalamazoo†	Sept 8	Jun 6	272	40.5	385.6	6655	−5
Lansing–A	Sept 9	Jun 3	268	38.9	357.3	6982	−10
Marquette–C	Aug 24	Jul 1	312	37.7	354.9	8529	−10
Muskegon–A	Sept 6	Jun 13	281	39.8	359.4	7089	−10
Port Huron†	Sept 4	Jun 17	287	39.9	383.8	7195	−5
Saginaw†	Sept 6	Jun 7	275	39.3	358.4	7063	−10
Sault Ste. Marie–A	Aug 8	Jul 15	342	37.3	314.6	9475	−20
St. Joseph†	Sept 12	Jun 7	269	42.0	365.0	6203	−10
Willow Run–A	Sept 17	May 31	257	39.8	—	6469	—
MINNESOTA							
Duluth–A	Aug 21	Jul 1	315	33.5	292.6	9937	−25
Duluth–C	Aug 21	Jul 5	319	35.3	295.2	9474	−25
International Falls–A	Aug 12	Jul 3	326	32.5	—	10600	—
Minneapolis–A	Sept 11	May 31	263	35.1	311.2	7853	−20
Moorhead†	Aug 23	Jun 16	298	34.0	—	9315	—
Rochester–A	Sept 5	Jun 5	274	35.5	311.7	8095	−20
St. Cloud–A	Aug 30	Jun 11	286	33.9	293.4	8893	−25
St. Paul–A	Sept 11	Jun 1	264	35.4	311.7	7804	−20
MISSISSIPPI							
Jackson–A	Oct 21	Apr 13	175	52.4	609.6	2202	15
Meridian–A	Oct 17	Apr 14	180	52.0	554.3	2333	10
Vicksburg–C	Oct 26	Apr 8	165	52.9	565.2	2000	10
MISSOURI							
Columbia–A	Sept 29	May 17	231	42.9	367.8	5113	−10
Hannibal†	Sept 24	May 29	239	43.1	368.3	5248	−10
Kansas City–A	Oct 5	May 12	220	42.8	365.5	4888	−10
St. Joseph–A	Oct 2	May 15	226	41.4	363.6	5336	−10
St. Louis–A	Oct 4	May 13	222	43.8	423.8	4699	0
St. Louis–C	Oct 8	May 10	215	44.2	425.6	4469	0
Springfield–A	Oct 1	May 19	231	44.7	373.8	4693	−10
MONTANA							
Billings–A	Sept 4	Jun 16	286	40.2	303.5	7106	−25
Butte–A	—	—	365	38.3	317.9	9760	−20
Glasgow–C	Aug 31	Jun 16	290	35.0	—	8690	—
Great Falls–A	Aug 26	Jun 28	307	40.4	320.0	7555	−20
Havre–C	Aug 29	Jun 22	298	37.4	283.4	8213	−30
Helena–A	Aug 24	Jun 30	311	38.5	316.7	8250	−20
Helena–C	Aug 20	Jul 3	318	39.4	318.6	8126	−20
Kalispell–A	Aug 17	Jul 5	323	40.1	320.0	8055	−20
Miles City–A	Sept 7	Jun 13	280	37.1	269.2	7822	−35
Missoula–A	Aug 24	Jul 1	312	39.8	—	7873	—

City	Average Date Season Begins	Average Date Season Ends	Days per Season	Average Temp., Deg. F.	K, Heat Required, Btu	No. of Degree-Days	Outside Design Temp., Deg. F
NEBRASKA							
Grand Island–A	Sept 23	May 26	246	39.3	337.2	6311	−15
Lincoln–A	Sept 23	May 25	245	40.1	358.3	6104	−10
Lincoln–C	Sept 27	May 21	237	40.3	360.6	5865	−10
Norfolk–A	Sept 17	May 31	257	37.5	333.4	7065	−15
North Platte–A	Sept 15	Jun 1	260	39.8	319.4	6546	−20
Omaha–A	Sept 24	May 20	239	39.2	357.9	6160	−10
Scotts Bluff–A	Sept 11	Jun 9	272	39.8	—	6841	—
Valentine–C	Sept 12	Jun 5	267	38.5	300.2	7075	−25
NEVADA							
Elko–A	Aug 29	Jun 27	303	40.8	—	7335	—
Ely–A	Aug 26	Jun 25	304	40.5	—	7443	—
Las Vegas–C	Sept 18	Apr 11	206	53.2	683.6	2425	20
Reno–A	Sept 4	Jun 26	296	44.6	398.3	6036	−5
Tonopah	Sept 17	Jun 12	269	43.4	454.3	5813	5
Winnemucca–A	Sept 4	Jun 17	287	42.8	345.9	6369	−15
NEW HAMPSHIRE							
Concord–A	Aug 29	Jun 15	291	38.8	336.2	7612	−15
Hanover†	Aug 21	Jun 25	309	39.1	318.1	8005	−20
Keene†	Aug 23	Jun 25	307	40.7	321.5	7458	−20
NEW JERSEY							
Asbury Park†	Sept 20	Jun 5	259	44.7	459.9	5272	5
Atlantic City–C	Sept 29	May 30	244	45.6	464.0	4741	5
Belvidere†	Sept 14	May 30	259	42.6	367.1	5792	−10
Bridgeton†	Sept 25	May 18	236	45.3	462.6	4661	5
Dover†	Sept 4	Jun 6	276	42.3	418.4	6270	0
Elizabeth†	Sept 20	May 24	247	43.5	422.8	5302	0
Jersey City†	Sept 22	May 25	246	43.9	424.1	5193	0
Lambertville†	Sept 17	May 26	252	43.9	395.8	5316	−5
Long Branch†	Sept 18	Jun 10	266	44.7	460.2	5396	5
Newark–A	Sept 25	May 24	242	43.3	421.9	5252	0
New Brunswick†	Sept 17	May 30	256	43.9	424.1	5404	0
Paterson†	Sept 18	May 27	252	43.7	423.6	5365	0
Phillipsburg†	Sept 16	May 27	254	42.6	391.2	5694	−5
Plainfield†	Sept 16	Jun 1	259	43.6	423.3	5535	0
Sandy Hook†	Sept 23	Jun 4	254	43.5	—	5470	—
Somerville†	Sept 18	May 29	254	43.1	392.7	5586	−5
South Orange†	Sept 12	Jun 1	263	43.2	393.1	5745	−5
Trenton–C	Sept 25	May 21	239	43.8	423.4	5068	0
NEW MEXICO							
Albuquerque–A	Oct 3	May 12	222	45.2	429.3	4389	0
Clayton–A	Sept 21	May 29	251	44.5	—	5138	—
Raton–A	Sept 4	Jun 15	285	42.5	391.0	6417	−5
Roswell–A	Oct 8	May 3	208	48.5	390.9	3424	−10
Santa Fe†	Sept 1	Jun 15	287	43.9	424.1	6063	0
NEW YORK							
Albany–A	Sept 9	Jun 3	268	39.0	357.6	6962	−10
Albany–C	Sept 15	May 28	256	40.3	360.6	6319	−10
Bear Mountain–C	Sept 10	Jun 6	270	40.9	—	6511	—
Binghamton–A	Aug 30	Jun 16	291	39.1	357.9	7537	−10
Binghamton–C	Sept 10	Jun 4	268	40.5	361.3	6556	−10
Buffalo–A	Sept 10	Jun 9	273	40.0	383.6	6838	−5
Cortland†	Aug 19	Jun 25	311	41.3	363.1	7388	−10
Elmira†	Sept 6	Jun 6	274	41.6	364.1	6412	−10
Glens Falls†	Sept 1	Jun 9	282	39.3	358.4	7244	−10

City	Average Date Season Begins	Average Date Season Ends	Days per Season	Average Temp., Deg. F.	K, Heat Required, Btu	No. of Degree-Days	Outside Design Temp., Deg. F
NEW YORK (Concluded)							
Ithaca†	Sept 4	Jun 9	279	40.9	362.3	6719	−10
Jamestown†	Sept 3	Jun 17	288	41.6	364.1	6740	−10
Little Falls†	Aug 27	Jun 22	300	39.7	319.2	7604	−20
New York–LaGuard.–A	Sept 30	May 24	237	43.9	424.1	4989	0
New York–C	Sept 28	May 26	241	44.0	424.7	5050	0
New York–Central Park	Sept 30	May 22	235	43.9	423.7	4965	0
Ogdensburg†	Sept 2	Jun 17	220	30.1	301.3	7688	−20
Oswego–C	Sept 9	Jun 15	280	40.1	360.3	6975	−10
Port Jervis†	Sept 9	Jun 5	270	41.4	387.5	6388	−5
Rochester–A	Sept 9	Jun 6	271	39.7	383.0	6863	−5
Schenectady–C	Sept 10	Jun 1	265	38.4	356.1	7050	−10
Syracuse–A	Sept 13	Jun 2	263	40.2	360.3	6520	−10
Watertown†	Sept 2	Jun 13	285	39.4	337.5	7298	−15
NORTH CAROLINA							
Asheville–C	Sept 29	May 19	233	47.5	440.9	4072	0
Charlotte–A	Oct 9	Apr 30	204	49.3	527.2	3205	10
Greensboro–A	Oct 4	May 9	218	47.5	514.3	3810	10
Hatteras–C	Oct 23	May 3	193	52.6	—	2392	—
Raleigh–A	Oct 8	May 6	211	49.0	525.2	3369	10
Raleigh–C	Oct 12	May 1	202	49.8	531.2	3075	10
Salisbury†	Oct 8	May 2	212	49.8	531.8	3222	10
Wilmington–A	Oct 19	Apr 24	188	52.6	612.7	2323	15
Winston-Salem–A	Oct 5	May 8	216	47.8	516.0	3721	10
NORTH DAKOTA							
Bismarck–A	Aug 31	Jun 16	290	33.9	278.4	9033	−30
Devils Lake–C	Aug 27	Jun 22	300	31.9	276.0	9940	−30
Fargo–A	Sept 1	Jun 14	287	32.7	291.7	9274	−25
Grand Forks†	Aug 15	Jun 23	313	33.8	293.3	9764	−25
Jamestown†	Aug 20	Jun 23	308	34.5	294.1	9406	−25
Minot†	Aug 16	Jun 25	314	34.5	279.3	9581	−30
Williston–C	Sept 1	Jun 19	292	33.9	265.3	9068	−35
OHIO							
Akron-Canton–A	Sept 19	May 30	254	40.6	385.2	6203	−5
Cincinnati–A	Sept 26	May 20	237	43.1	421.0	5195	0
Cincinnati–C	Oct 4	May 14	223	44.7	427.1	4532	0
Cincinnati–Abbe Obs.	Sept 30	May 18	231	43.9	424.1	4870	0
Cleveland–A	Sept 21	May 29	251	41.1	414.1	6006	0
Cleveland–C	Sept 23	May 29	249	42.0	417.3	5717	0
Columbus–A	Sept 23	May 25	245	42.1	365.4	5015	−10
Columbus–C	Sept 27	May 22	238	42.8	367.5	5277	−10
Dayton–A	Sept 25	May 25	243	42.0	417.3	5597	0
Lancaster†	Sept 17	May 25	251	44.0	396.0	5272	−5
Lima†	Sept 13	Jun 1	262	42.4	390.6	5935	−5
Marion†	Sept 19	May 27	251	42.4	366.3	5685	−10
Sandusky–C	Sept 23	May 29	249	41.5	415.6	5859	0
Toledo–A	Sept 16	May 31	258	40.2	360.3	6394	−10
Warren†	Sept 10	Jun 11	275	42.8	467.4	6117	−10
Youngstown–A	Sept 18	Jun 1	257	41.0	386.4	6172	−5
OKLAHOMA							
Muskogee†	Oct 8	May 6	211	47.9	443.0	3616	0
Oklahoma City–A	Oct 15	May 1	199	46.7	436.4	3644	0
Oklahoma City–C	Oct 16	Apr 27	194	46.9	437.1	3519	0
Tulsa–A	Oct 15	Apr 27	195	46.6	436.1	3584	0

City	Average Date Season Begins	Average Date Season Ends	Days per Season	Average Temp., Deg. F.	K, Heat Required, Btu	No. of Degree-Days	Outside Design Temp., Deg. F
OREGON							
Astoria–A	—	—	365	51.3	—	4995	—
Baker–C	Aug 25	Jul 4	314	42.4	390.6	7087	−5
Burns–C	Aug 29	Jun 26	302	42.1	—	6918	—
Eugene–A	Sept 2	Jun 28	300	49.1	572.9	4779	15
Meacham–A	Aug 6	Jul 16	345	42.1	—	7888	—
Medford–A	Sept 17	Jun 13	270	48.2	478.3	4547	5
Pendleton–A	Sept 18	Jun 4	260	45.0	352.7	5204	−15
Portland–A	Sept 7	Jun 26	293	49.2	526.3	4632	10
Portland–C	Sept 16	Jun 18	276	50.0	532.2	4143	10
Roseburg–C	Sept 13	Jun 19	280	50.3	519.0	4122	10
Salem–A	Sept 5	Jun 23	292	49.3	575.6	4574	15
Troutdale–A	Sept 4	Jun 27	297	48.9	—	4775	—
PENNSYLVANIA							
Allentown–A	Sept 18	May 26	251	41.6	415.9	5880	0
Altoona†	Sept 8	Jun 7	273	42.6	391.2	6121	−5
Coatesville†	Sept 19	May 26	250	43.7	394.4	5365	−5
Erie–C	Sept 20	Jun 4	258	41.3	387.1	6116	−5
Franklin†	Sept 5	Jun 11	280	42.2	344.2	6383	−15
Harrisburg–A	Sept 22	May 20	241	43.2	421.4	5258	0
Lancaster†	Sept 13	May 27	257	43.7	423.4	5482	0
Lebanon†	Sept 16	May 28	255	43.1	421.3	5585	0
New Castle†	Sept 12	May 30	261	42.2	418.1	5958	0
Philadelphia–A	Sept 28	May 19	234	44.2	425.1	4866	0
Philadelphia–C	Oct 2	May 17	228	45.2	429.3	4523	0
Pittsburgh-Allegheny–A	Sept 24	May 25	244	42.2	418.0	5555	0
Pittsburgh-Gr. Pitt.–A	Sept 19	May 29	253	41.7	416.3	5905	0
Pittsburgh–C	Sept 28	May 19	234	43.4	422.0	5048	0
Reading–C	Sept 26	May 21	238	43.7	423.4	5060	0
Scranton–C	Sept 15	May 30	258	41.6	388.0	6047	−5
Uniontown†	Sept 10	May 24	257	44.9	399.4	5176	−5
Warren†	Sept 2	Jun 18	290	41.8	343.1	6740	−15
Williamsport–A	Sept 18	May 28	253	41.7	388.4	5898	−5
York†	Sept 16	May 26	253	43.5	394.2	5449	−5
RHODE ISLAND							
Block Island–A	Sept 13	Jun 19	280	44.1	424.9	5843	0
Providence–A	Sept 11	Jun 8	271	42.4	418.6	6125	0
Providence–C	Sept 18	Jun 1	257	43.2	421.4	5607	0
SOUTH CAROLINA							
Charleston–A	Sept 27	Apr 15	201	55.2	658.5	1973	15
Charleston–C	Oct 28	Apr 10	165	54.3	639.6	1769	15
Columbia–A	Oct 18	Apr 17	182	51.6	549.3	2435	10
Columbia–C	Oct 19	Apr 17	181	52.4	558.4	2284	10
Florence–A	Oct 16	Apr 20	187	51.6	598.7	2507	15
Greenville–A	Oct 12	Apr 30	201	49.8	531.3	3060	10
Spartanburg–A	Oct 12	Apr 30	201	49.9	580.3	3044	15
SOUTH DAKOTA							
Huron–A	Sept 12	Jun 3	265	29.8	311.2	7902	−20
Pierre†	Sept 4	Jun 17	287	39.2	—	7420	—
Rapid City–A	Sept 5	Jun 17	286	26.3	317.1	7535	−20
Sioux Falls–A	Sept 10	Jun 4	268	29.3	312.0	7848	−20
Yankton†	Sept 14	Jun 1	261	37.6	—	7144	—

City	Average Date Season Begins	Average Date Season Ends	Days per Season	Average Temp., Deg. F.	K, Heat Required, Btu	No. of Degree-Days	Outside Design Temp., Deg. F
TENNESSEE							
Bristol–A	Sept 29	May 16	230	47.0	—	4148	—
Chattanooga–A	Oct 8	May 4	209	48.8	523.3	3384	10
Knoxville–A	Oct 8	May 4	209	47.8	442.7	3590	0
Memphis–A	Oct 15	Apr 23	191	48.6	447.3	3137	0
Memphis–C	Oct 19	Apr 22	186	48.8	449.0	3006	0
Nashville–A	Oct 11	May 2	204	47.8	442.4	3513	0
TEXAS							
Abilene–A	Oct 22	Apr 14	175	49.8	579.9	2657	15
Amarillo–A	Oct 2	May 17	228	45.9	378.6	4345	−10
Austin–A	Nov 2	Apr 1	151	53.7	691.2	1713	20
Brownsville–A	Dec 3	Feb 16	77	57.0	974.5	617	30
Corpus Christi–A	Nov 15	Mar 15	121	56.6	767.0	1011	20
Dallas–A	Oct 27	Apr 6	162	51.0	465.0	2272	0
El Paso–A	Oct 19	Apr 19	183	50.6	538.4	2641	10
Fort Worth –A	Oct 27	Apr 10	166	50.8	540.4	2361	10
Fort Worth–A. Carter Fld.	Oct 27	Apr 9	165	50.8	540.9	2338	10
Galveston–A	Nov 13	Mar 28	136	55.9	744.4	1233	20
Galveston–C	Nov 13	Mar 29	137	56.2	751.2	1211	20
Houston–A	Nov 6	Mar 30	145	55.4	730.6	1388	20
Houston–C	Nov 8	Mar 25	138	55.8	739.2	1276	20
Palestine–C	Oct 30	Apr 7	160	52.6	612.7	1980	15
Port Arthur–A	Nov 2	Apr 1	151	55.0	718.6	1517	20
Port Arthur–C	Nov 7	Mar 29	143	55.6	735.8	1340	20
San Angelo–A	Oct 27	Apr 5	161	51.9	—	2107	—
San Antonio–A	Nov 5	Mar 29	145	54.1	700.4	1579	20
Waco–A	Oct 30	Apr 5	158	52.2	667.2	2025	20
Wichita Falls–A	Oct 19	Apr 20	184	48.6	—	3025	—
UTAH							
Blanding	Sept 11	Jun 10	273	42.5	—	6138	—
Logan†	Sept 4	Jun 20	290	41.7	343.1	6748	−15
Milford–A	Sept 10	Jun 11	275	41.6	338.0	6445	−15
Modena†	Sept 3	Jun 20	291	42.2	—	6635	—
Ogden†	Sept 13	May 28	258	49.4	369.9	5538	−10
Salt Lake City–A	Sept 16	Jun 6	264	42.8	367.5	5866	−10
Salt Lake City–C	Sept 20	May 29	252	43.3	369.0	5463	−10
VERMONT							
Burlington–A	Sept 3	Jun 10	281	37.0	353.4	7865	−10
Northfield†	Aug 8	Jul 1	328	38.6	—	8719	—
VIRGINIA							
Cape Henry–C	Oct 12	May 12	213	49.5	528.8	3307	10
Charlottesville†	Sept 17	May 12	238	47.3	512.8	4223	10
Danville†	Oct 8	May 6	211	48.4	520.3	3511	10
Lynchburg–A	Sept 29	May 12	226	46.6	469.6	4153	5
Norfolk–A	Oct 8	May 11	216	49.0	572.5	3454	15
Norfolk–C	Oct 13	May 7	207	49.9	580.7	3119	15
Richmond–A	Oct 4	May 12	221	47.1	558.1	3955	15
Richmond–C	Oct 6	May 9	216	47.8	562.9	3720	15
Roanoke–A	Oct 1	May 14	226	46.6	469.6	4152	5
Wytheville†	Sept 13	Jun 2	263	45.9	—	5022	—

City	Average Date Season Begins	Average Date Season Ends	Days per Season	Average Temp., Deg. F.	K, Heat Required, Btu	No. of Degree-Days	Outside Design Temp., Deg. F
WASHINGTON							
Aberdeen†	—	—	365	49.7	530.8	5586	10
Bellingham†	—	—	365	50.2	534.9	5417	10
Ellensburg–A	Sept 2	Jun 23	295	42.8	—	6542	—
Everett†	—	—	365	48.7	522.9	5941	10
Kelso–A	—	—	365	50.6	—	5239	—
North Head	—	—	365	50.7	648.0	5211	20
Olympia–A	—	—	365	49.9	580.7	5501	15
Omak	Sept 2	Jun 12	284	40.9	—	6834	—
Port Angeles–A	—	—	365	49.0	—	5850	—
Seattle–C	Aug 28	Jul 2	309	50.6	588.1	4438	15
Seattle-Tacoma–A	Aug 10	Jul 18	343	49.6	578.1	5275	15
Spokane–A	Aug 31	Jun 27	301	42.2	365.8	6852	−10
Stampede Pass	—	—	365	39.9	—	9149	—
Tacoma–C	Aug 13	Jul 9	331	50.3	584.7	4866	15
Tatoosh Island–C	—	—	365	49.3	575.0	5724	15
Walla Walla–C	Sept 20	May 27	250	45.6	377.1	4848	−10
Yakima–A	Sept 6	Jun 9	277	43.9	395.4	5845	−5
WEST VIRGINIA							
Charleston–A	Oct 1	May 17	229	45.7	431.8	4417	0
Elkins–A	Sept 12	Jun 6	268	43.5	369.6	5773	−10
Fairmont†	Sept 20	May 23	246	44.5	372.5	5047	−10
Huntington–C	Oct 4	May 11	220	46.5	406.3	4073	−5
Parkersburg–C	Sept 30	May 18	231	44.4	372.9	4750	−10
Petersburg–C	Sept 23	May 22	242	44.5	—	4966	—
Wheeling†	Sept 19	May 21	276	46.1	404.6	5218	−5
WISCONSIN							
Beloit†	Sept 10	Jun 5	269	39.4	358.6	6876	−10
Eau Claire†	Sept 2	Jun 9	281	36.6	313.6	7970	−20
Green Bay–A	Sept 2	Jun 12	284	35.9	312.2	8259	−20
La Crosse–A	Sept 10	May 31	264	36.0	296.2	7650	−25
Madison–A	Sept 10	Jun 4	268	37.3	333.2	7417	−15
Madison–C	Sept 13	Jun 3	264	37.3	333.2	7300	−15
Milwaukee–A	Sept 10	Jun 12	276	38.9	336.2	7205	−15
Milwaukee–C	Sept 15	Jun 12	271	39.4	337.7	6944	−15
Oshkosh†	Sept 5	Jun 11	280	38.1	335.1	7508	−15
Sheboygan†	Sept 4	Jun 21	291	39.6	359.1	7382	−10
WYOMING							
Casper–A	Aug 31	Jun 22	296	39.2	336.8	7638	−15
Cheyenne–A	Aug 26	Jun 28	307	40.4	339.4	7562	−15
Lander–A	Aug 29	Jun 22	298	37.1	314.4	8303	−20
Rock Spring–A	Aug 27	Jun 29	307	37.4	—	8473	—
Sheridan–A	Sept 1	Jun 23	296	38.3	284.9	7903	−30
Yellowstone Park†	—	—	365	38.8	—	9554	—

A indicates data from a weather station at an airport.

C indicates data from a city weather office.

† indicates that data for stations so marked are not strictly comparable with those marked *A* or *C* and cover an earlier period of years. However, close examination of the data seems to indicate that for degree day purposes any error involved in using these data is small and the figures can be used with reasonable safety.

Centrifugal Pump Application

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Part 2. Pump Heads, Suction Conditions

This is the second of a series of five articles on application and selection criteria for centrifugal pumping systems.

NOW that we have discussed "head terms" of a general nature, it becomes necessary to define the head terms used specifically in connection with centrifugal pumps. The definitions given herein are based on the current Standards of the Hydraulic Institute, except where otherwise noted.

Suction Head and Suction Lift

The total suction head, denoted by the symbol h_s is the static head on the pump suction line above the pump centerline minus the friction head losses (including the entrance loss in the suction piping for the capacity under consideration), plus any pressure existing at the suction supply. In this definition, a vacuum is considered as a negative pressure.

When the suction head is negative, and when the pump takes its suction from an open tank under atmospheric pressure, the term "suction lift" is used. Thus, since a suction lift is a negative suction head measured below atmospheric pressure, the total suction lift (symbol also h_s) is the static suction lift measured to the pump centerline plus the friction losses.

In some cases, it is preferable to express both the suction head and the discharge head in absolute pressures. A gage connected to the suction line of a pump, corrected to the pump centerline, measures the total suction head above atmospheric pressure minus the velocity head at the point of attachment, since it registers pressure only. Because a suction lift is a negative suction head, a vacuum gage indicates the sum of the total suction lift and of the velocity head at the point of attachment.

The three most commonly encountered suction arrangements are illustrated on Fig. 8. Case 1 shows a pump taking its suction from a tank under pressure and includes all the components of suction head we have mentioned. If the tank is under a pressure below atmospheric (i.e. P_s is a partial vacuum) and if we wish to express the suction head h_s as a gage reading, the vacuum expressed in feet of liquid is a negative pressure head and will have a minus (—) sign. On the other hand, if h_s is to be expressed in absolute pressure values, the pressure P_s is also expressed in absolute terms.

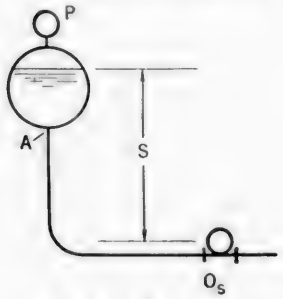
Case 2, illustrates a very common type of installation, with the suction supply under atmospheric pressure and located above the centerline of the pump. The suction head expressed in gage values has a component P_s (as in Case 1) equal to zero which can therefore be dropped out of the formula.

The most comon type of pump installation is one illustrated in Case 3, where the suction supply is located below the pump centerline. In such a case, as mentioned before, the suction head may either be expressed as a negative suction head or in positive values as a suction lift. Since the source of supply is below the pump centerline, the difference in elevation S takes a negative value in the calculation of suction head.

If in Case 3 a suction gage is attached to the pump suction flange and if its reading is corrected to the pump centerline, the gage will register a partial vacuum or a negative pressure. To determine the suction head, it becomes necessary to add algebraically the velocity head to this negative pressure. If it is desired to work in terms of vacuum, the velocity head is subtracted from the vacuum to get the suction lift.

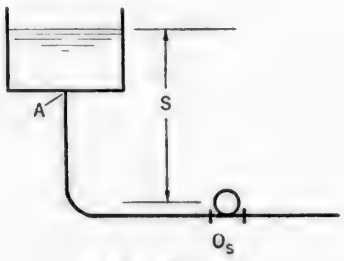
For example, assume that a gage is attached to the suction of a pump with a 4-inch nozzle and that when pumping a capacity of 500 gpm of cold water, the gage reading corrected to the pump centerline is a vacuum of 9 inches of

Case 1 Suction from source under pressure other than atmospheric and located above pump centerline



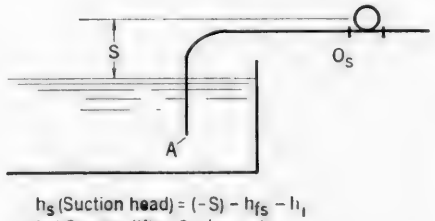
$h_s = S - h_{fs} - h_i + P_s$

Case 2 Suction from source under atmospheric pressure and located above pump centerline



$h_s = S - h_{fs} - h_i$

Case 3 Suction from source under atmospheric pressure and located below pump centerline



h_s (Suction head) $= (-S) - h_{fs} - h_i$
$(-h_s)$(Suction lift) $= S + h_{fs} + h_i$

Fig. 8. Determination of suction head for three typical cases, where h_i = entrance loss at A; h_{fs} = friction loss from A to O_s.

mercury, equivalent to 10.2 feet of water. Therefore the suction head is (—10.2 +2.5) or —7.7 feet of water, and the suction lift is (10.2 — 2.5) or 7.7 feet.

The Term NPSH

When handling liquids in a pumping system, it is necessary that the pressure at any point in the system and in the impeller never be reduced to a value below the vapor pressure of the liquid at the pumping temperature. In any centrifugal pump, there is a definite friction and velocity head loss which takes place before the liquid enters the impeller vanes to a degree sufficient for it to receive energy from the pumping action of the impeller. When liquid enters the suction of a centrifugal pump, a certain amount of pressure energy is therefore converted into kinetic energy, the exact amount of this conversion depending upon various features of the suction passages and of the impeller inlet design. Therefore, in order to prevent flashing of the liquid at the impeller inlet, it is necessary to provide sufficient energy at the pump suction in excess of the vapor pressure. Otherwise, the static pressure at the impeller vanes will fall below the vapor pressure and a portion of the liquid will flash into vapor. This flashing will form vapor-filled cavities within the body of the flowing liquid and cavitation, as this phenomenon is called, will have taken place.

Cavitation, actually, is a general term given to all the phenomena which accompany the reduction of the static pressure at the impeller suction below the vapor pressure. The immediate effect of cavitation is to prevent a further increase of the pump capacity, as the pumping space normally allotted to the flow of liquid is occupied by vapor. As the vapor bubbles pass on to regions in the impeller where additional energy is made available, this energy causes condensation and collapse of the bubbles—generally with the accompaniment of considerable noise and vibration. This violent collapse produces water hammer pressures of a great intensity on small localized areas of the impeller, frequently causing premature failure through pitting and erosion of the impeller suction areas.

Since it is difficult to measure the static pressure at the impeller entrance proper, it has become the practice to determine the amount of energy required over and above the vapor pressure as measured at the pump suction and referred to the pump centerline. Thus, the *required* NPSH (net positive suction head) is a measure of the energy necessary to overcome the losses in the pump suction passages and to force the liquid into the area between the impeller vanes. It becomes apparent that by means of this definition, the *required* NPSH becomes automatically independent of the vapor pressure of the liquid and hence of its characteristics or temperature.

In turn, the energy *available* in a given suction system to get the liquid into the impeller is the total suction head less the vapor pressure of the liquid at the pumping temperature and this available energy is therefore the *available* NPSH. It represents therefore strictly a characteristic of the system in which a centrifugal pump works, while the *required* NPSH is a function of the pump design at a given capacity.

A great many factors, such as eye diameter, suction area of the impeller, shape and number of impeller vanes, area between these vanes, shaft and impeller hub diameter, impeller specific speed, the shape of the suction passages and many more enter in some form or another into determining the required NPSH. No single one of these factors can be used exclusively and, therefore, the knowledge of the value of one or two of these factors can serve no useful end and can only confuse the issue if used as a basis of comparison.

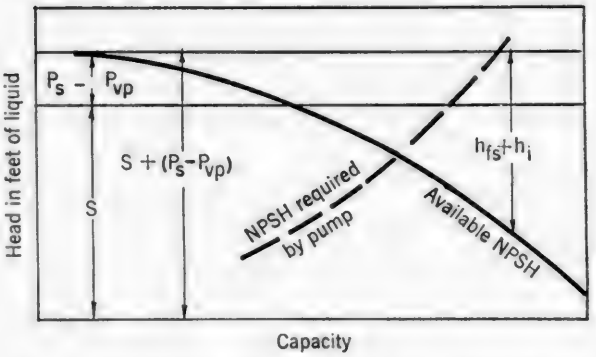


Fig. 9. Determination of available NPSH and comparison with required NPSH over a range of capacities. P_s = static pressure on liquid; P_{vp} = vapor pressure of liquid at pumping temperature; S = height of liquid; h_{fs} = friction loss; h_i = entrance loss.

In determining the available NPSH, both the suction head and the vapor pressure must be expressed in feet of the liquid handled and must both be either in gage or absolute units. For instance, a pump handling 62 deg F water (vapor pressure = 0.6 ft) at sea level with 0 feet total suction lift, has an available NPSH of 33.9 — 0.6 = 33.3 feet, while if the pump were operating with 15 ft total suction lift, the available NPSH = 33.9 — 0.6 — 15 = 18.3 ft.

It becomes obvious that when a pump is operating on a suction lift, the available NPSH is the atmospheric pressure minus the sum of the suction lift and the vapor pressure of the water. To handle the same capacity of any other liquid at any other temperature, the same amount of energy must be available at the suction nozzle. Thus, in the case of a liquid at its boiling point (in other words, when it is under a pressure equivalent to the vapor pressure corresponding to its temperature) this energy has to exist entirely as a positive head, while if the liquid is below its boiling point, the suction head required is reduced by the difference between the pressure on the liquid and the vapor pressure corresponding to the temperature.

Both the available and the required NPSH vary with capacity, as illustrated in Fig. 9. With a given static pressure or elevation difference at the suction side of a centrifugal pump, the available NPSH is reduced with increasing capacities due to the friction losses in the suction piping. On the other hand, since the required NPSH is a function of the velocities in the suction passages and at the inlet of the impeller, it increases essentially as the square of the capacity. Therefore, if the problem under examination is relatively complex, it is advantageous to show the variation in available NPSH superimposed graphically on the same curve giving the variations in required NPSH of the pump being considered, in order to see if the pump is suitable.

Suction limitations for given capacities in a given pump were formerly always expressed in terms of permissible suction lift at sea level. This required considerable cal-

culation if the pump was to handle water at higher temperatures, or if the pump was installed at some location above sea level or if the pump handled liquid other than water. All these additional calculations are tedious and may lead to errors. As a result, there is a marked tendency to indicate the suction limitations of all pumps by means of an NPSH vs. capacity curve.

Specifying Suction Conditions

As most centrifugal pump troubles occur on the suction side of the pump, it is very important that inquiries for new pumps give the vendors complete information on the suction conditions. A pump will be unable to meet its design capacity conditions unless the suction head can provide enough energy to get the required quantity of the liquid into the pump. If a cold non-volatile liquid is to be handled, it is necessary to know whether there is head on the suction or whether the pump will handle a suction lift and if the latter, what will be the maximum lift. In the event the liquid is hot or under a pressure corresponding to or near to its vapor pressure, the pump must be installed so as to provide head on the suction and the available submergence and friction losses in the suction piping must be made known. If the pump handles liquids other than water, information on the pumping temperature and vapor pressure is necessary.

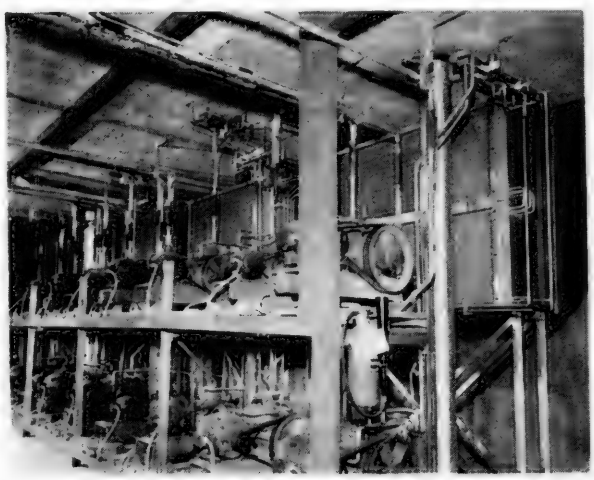
Of course, any expected or likely variations in the suction conditions from maximum to minimum should also be specified.

Next month: Discharge conditions and total head.

Air-Cooled Supermarket in Semi-Tropical Climate

The Handy-Andy supermarket at Bandera Road, San Antonio, Texas, has a total of 162 horsepower of refrigeration and air conditioning operating air cooled. The installation was made last winter and operated without any difficulties during the abnormally hot summer of 1955.

Col. Melton J. Landry, building construction supervisor, and Harold Vogt, maintenance supervisor of the Handy-Andy Company, made a careful study of the refrigeration and air conditioning problems. After deciding to use the characteristics of remote-type air-cooled condensers, they installed a small system for test and further investigation. Units were installed at their Bandera and Cincinnati Street Stores for a 3-hp condensing unit connected to three frozen food cases and a 2-hp on two self-service meat cases. After operating the trial system through one summer and winter, they proceeded with plans to make their new shopping center at Bandera Road, San Antonio, a complete air-cooled condenser installation.



Compressors and multiple circuits serving air-cooled condensers at a San Antonio, Texas, supermarket where loads call for 100 tons of air conditioning and over 60 hp of refrigeration for food products.

Refrigeration

A unique lift slab construction was used on this new shopping center where the first floor and roof were precast and then raised into position. The building is unusual, in that the walls of the basement are 18 inches from the first floor with a resulting air space completely around the basement area. All the compressors are located in the basement. The commercial refrigeration equipment consists of 19 Brunner compressors, totaling 60½ hp. There are five multi-circuited condensers servicing the 19 compressors. There are seven 5-hp units, six 3-hp, three 1½ hp and three 1-hp units which are connected to 66 ft of frozen food cases, 24 ft frozen fish cases and 100 ft of self-service meat cases, 55 ft of fresh vegetable cases, one 35 deg F dairy box, one 0 deg frozen food box, one 55 deg process room, one 32 deg fresh meat cooler, one 34 deg smoked meat storage, one 34 deg cheese storage and one 40 deg fresh vegetable storage. In order to eliminate low head pressure problems during the cold weather, each of the 19 compressors were equipped with a control which automatically maintains a fixed minimum head pressure regardless of the air temperature entering the condenser.

The air conditioning totals 100 tons using four 25-hp Brunner compressors assembled with two Acme Dry-Ex Chillers as packaged by U. S. Airco. The 100-hp compressors are connected to four Kramer Unicons located on the roof directly over the location of the compressors. Due to the comparatively light weight of the condensers, the installation did not present any problems in rigging, mounting and installation.

The Unicons were supplied through United Supply Company in San Antonio, Texas, and the installation was made by W. F. Vogt, Fred Mann and Bill Bourland, supervised by Harold Vogt.

Mr. Harold Vogt, maintenance supervisor, said that his firm is pleased with the operation of the system, and that the main reason his company was sold on this type of installation is that it cuts their operating, maintenance and upkeep cost of condenser equipment to a minimum. During the past eight months the maintenance cost has been zero.

LOUIS BLENDERMANN ON

PIPING AND PLUMBING

Water and Drainage Facilities for Animal Quarters

As medical research expands, so does the need for adequate quarters to house the animals used for experimental study.

Animals play a large part in this increasing quest for scientific knowledge. Experiments are performed with the animals quartered under sanitary conditions to prevent the spread of disease from one test animal to others. Weeks of study would thus be nullified.

Since it is necessary to house the experimental animals in the confines of research laboratories, adequate quarters must be provided that are convenient for treating, observing and caring for the animals. In this article, data are presented for the proper water and drainage facilities required in the animal cages. For example, only the proper housing for monkeys and animals of comparable size will be considered. Only the larger size cages are considered because they offer greater freedom of motion for the animals and permit closer study of the physical conditions of the animals.

Adequate Quarters

Since the monkeys must be properly housed, careful thought should be given to both the cages in which they are to be kept, and to the necessary facilities for keeping the cages clean and sanitary. A typical arrangement of cages would be similar to that shown in Fig. 1.

An arrangement of six cages has been used for this example, with a floor drain in each cage. Serving the group of six cages is a tempering valve that supplies water of the correct temperature for washing this group of cages.

Cleaning the Cages

Since cleanliness is an important factor and must be strictly maintained, it is necessary to provide the means for facilitating good sanitation.

A tempering valve regulates the temperature of the water to a degree suitable for cleaning the cages. Droppings from the monkeys as well as bits of food are the debris that must be removed. Figure 2 shows an arrangement that will permit proper cleaning.

As shown in Fig. 2, the tempered water is furnished by mixing cold and hot water to the desired temperature. Warm water is more effective in cleaning the droppings that stick to the floor of the cage. A hose is used to clean the cage floor, and water is applied to the floor in a gentle manner. By means of a squeegee or a scraper, all the matter is swept into the drain. This cleaning can usually be accomplished from outside the cage and this is quite an advantage.

Frequent and proper cleaning of the cages is an important factor and is quite necessary to insure true results from the various experiments performed.

This manner of cage cleaning is recommended over the method of just flushing the cage with a hose. In addition, this method avoids wetting the monkeys or splashing the sides of the cage with water. The result is that the cage is quickly cleaned in an efficient manner and the floor will dry rather quickly because radiant heating coils are generally used to maintain the correct temperatures in the cages. Vacuum breakers must be installed on the water supply line to avoid possible contamination of the water supply through backflow. This reversal of flow results from a drop in water pressure in the main that feeds the supply line for the cages. The drop of pressure can be caused by any number of reasons.

Sterilization of the Cages

Sterilization of the cages is periodically required to assure clinically clean conditions for the varied experiments. Either live steam or strong disinfectants are used for this purpose. The entire cage can be thoroughly cleaned by these processes.

Since strong possible corrosive, solutions of disinfectants may be used, consideration should be given to both

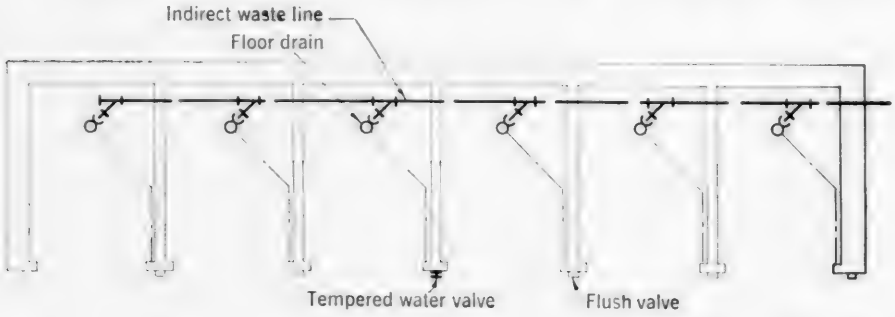


Fig. 1. Plan of a typical arrangement of water and waste facilities in cages.

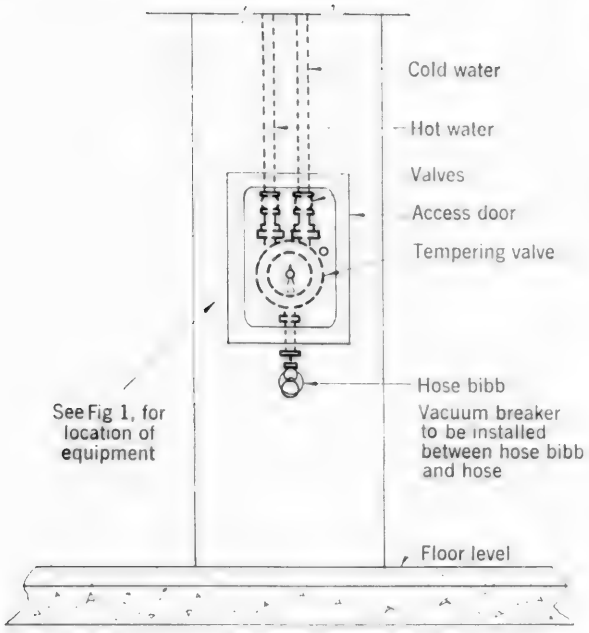


Fig. 2. Arrangement of water supply for washing cages.

the floor drain and the waste piping to insure that they are of materials that will withstand attack by the solution.

Proper Drainage

Proper cleaning of the cage requires an approved drainage system. Water used in washing can be intercepted and drained through the floor drain in each cage. The drainage system, however, must be carefully designed to serve the needs of the cages. The floor drain is a special type and this plus the drainage system are detailed in Fig. 3.

The special floor drain includes a secured grate to prevent its removal by the monkeys. Furthermore, the interior of the drain is enameled to provide the highest sanitary conditions. The enameled interior of the drain offers a surface that is smooth and, therefore, foreign material is prevented from clinging to it.

Droppings from sick or infected monkeys are contaminated and even though the cage has been cleaned by washing this matter into the drain, the drain itself must be so designed to be sure that the waste matter is discharged in a positive manner into the drainage system for the cage.

This is accomplished by a flush valve in a suitable location outside of the cage. After the cage is cleaned, the valve is flushed to thoroughly wash out the drain with fresh water. This flushes out all matter remaining in the drain. The flush valve should be of the type that includes a vacuum breaker to avoid the contamination that backflow could create in the water supply line. The method described offers a positive way of keeping the drain clean.

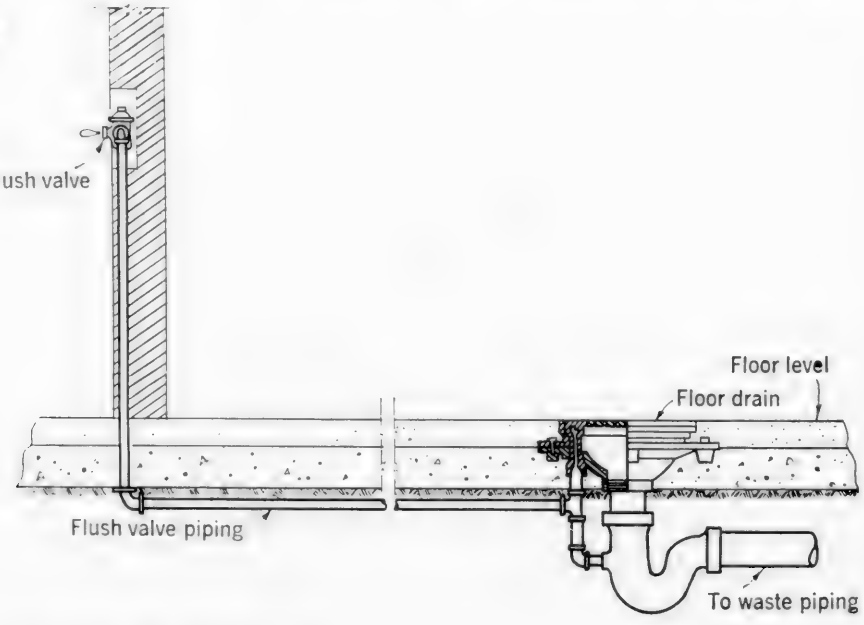
It will be noted that flashing has been installed with the drain so that there is a watertight installation in the floor slab.

Waste System

Although every consideration must be given to the cages to maintain the highest standards of sanitation, sufficient thought should also be given to the waste line to which the drains are connected. This system must be so installed that a stoppage in another part of the sanitary system will not back up and overflow in the cages. The surest way to accomplish this is to provide an indirect system of waste piping. A suggested piping arrangement is shown in Fig. 4.

This piping receives the discharge from each of the drains and in turn discharges into a sump receiver. The purpose of a sump receiver tank is to allow for the introduction of disinfectants to the waste to be certain that the waste matter is properly treated before it enters the sanitary system. This chemical treatment of the waste is often required before this matter enters the sanitary lines in the building, and it will prevent the possible spread

Fig. 3. Section through a cage to show arrangement of flush valve and floor drain.



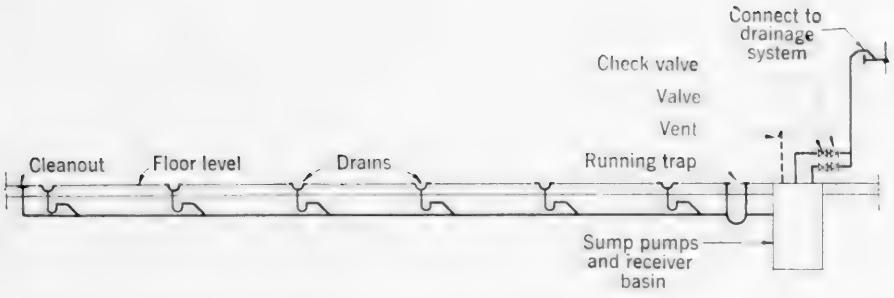


Fig. 4. Diagram to show how waste facilities and fittings are placed.

of this contamination to other portions of the sanitary system.

Not only must consideration be given to the cages, but in an equal manner, utmost care must also be given to the design of the waste system and the manner with which it connects with the sanitary system.

Other Applications

Although the information presented covers the water and waste facilities required for animal cages in a laboratory, the same consideration may also be extended to similar cages in a zoo.

There is an entirely new concept of thinking in the planning of zoos, including quarters that represent more closely the natural habitat of the animals. Glass is now used for certain cages where bars were formerly used. Moats or other specific barriers are now employed to restrict the activities of certain larger animals. Such innovations offer zoo patrons an unobstructed view of the wildlife in its natural habitat. In addition, these considerations insure the health of the animals because the animals enjoy sufficient exercise and do not experience the feeling of confinement. To satisfy this new concept in zoos, a more elaborate water supply system and drainage facilities will be required.

Water supply, for example, will be required for drinking, spray ponds, pools, watering as well as for washing the animal quarters. Therefore, it must be abundant in supply and so installed that it will not be subject to freezing. Control valves must be accessible at all times.

The drainage lines must be adequately sized for the loads imposed. Drains and catch basins have to be carefully selected for the function intended. Leaves, dirt and other foreign material poses problems that only a carefully designed drainage system can handle.

Winter quarters for the animals also require careful consideration with regard to the design of the water and waste facilities.

The food preparation rooms, kitchens and baking areas, as well as the food storage lockers, also need a more comprehensive system of facilities. Areas used for raising rodents or other special food needed in the diets of some animals and reptiles also demand certain prescribed design requirements. This is a subject by itself.

Skyscraper Has Electronic Thermostat Control

Strategically located throughout the new Prudential Insurance Company $40-million skyscraper on the lake front of Chicago, are 180 electronic thermostats which are linked to a master control panel. Supplementing these are more than 1,200 pneumatic and electric thermostats, all integrated into a network of more than 20 miles of copper tubing and nearly 30 miles of electrical wiring. All function to control human comfort in this office building. The building size makes this system important.

The system was designed by engineers of Minneapolis-Honeywell Regulator Company in cooperation with Prudential's architects and engineers, Naess and Murphy.

The master control panel automatically adjusts for the different heating or cooling needs posed by outdoor conditions. It compensates, too, for changes in temperature that occur in the morning when the building suddenly fills with thousands of people arriving for work and in the evening when they leave. It also adjusts automatically for the heat produced by lights, by office machinery, and by large numbers of people in conference rooms, auditoriums and central working spaces. The building engineer, by the flick of a switch, can shift the building's huge year-round air conditioning plant from day to night operation or to either a summer or winter schedule.

One dial on the panel controls snow-melting equipment installed in sidewalks at the two principal entrances.

The electronic system is designed so that it can be supplemented later, if desired, with such new electronic developments as wind direction indicators. sun intensity meters and electronic "people counters."

Another future possibility, according to John D. Haines, Honeywell vice president, is an electronic scanning monitor that would automatically check thermostats.

INNOVATION

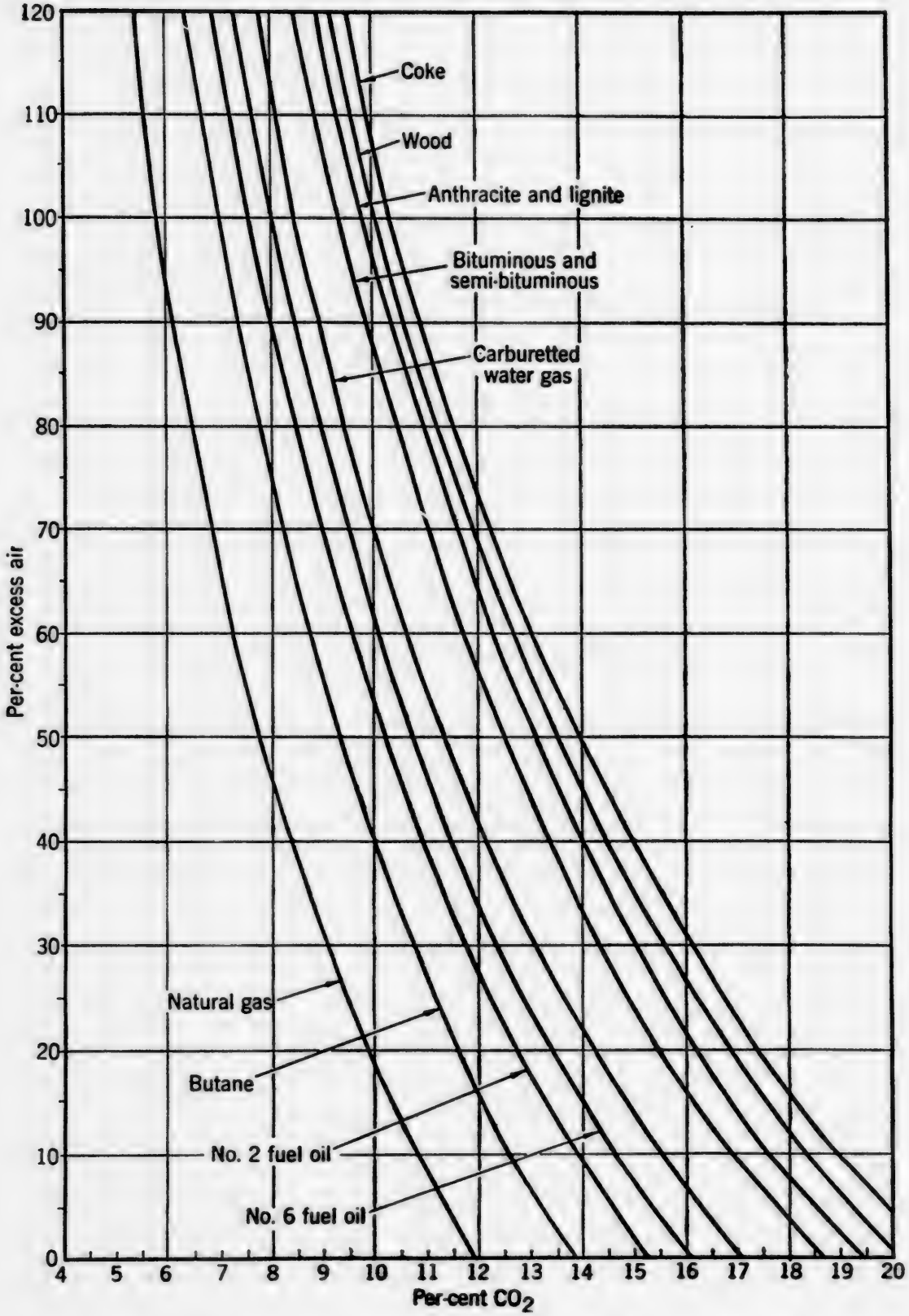
Starting with this issue (beginning on the page opposite), the Reference Data Sheet, the Detail Sheet, and the Ad-Digest appear on consecutive pages. In addition, the Reference Data Sheet is now on white instead of blue paper, the Ad-Digest on white instead of yellow or pink paper. Both the Data Sheet and Detail Sheet are scored for easy removal.

DIMENSIONAL AND CAPACITY DATA — TYPE M COPPER TUBE

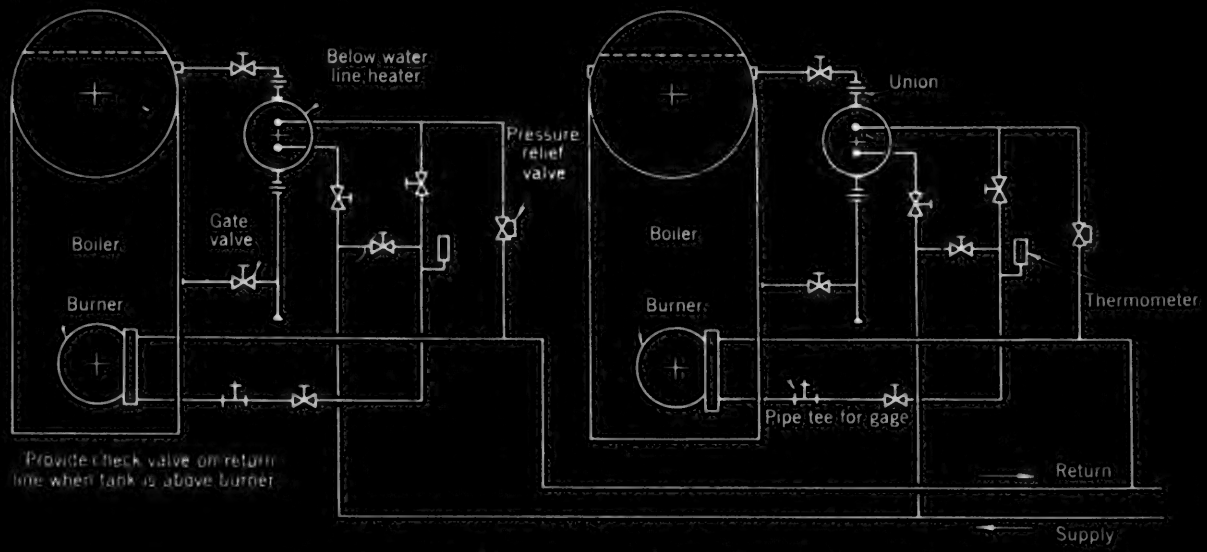
Diameter, Inches			Wall Thickness, In.	Cross-Sectional Area, Sq. In.			Weight per Foot, Lb.		
Nominal	Actual Inside	Actual Outside		Outside	Inside	Metal	Of Tube Alone	Of Water in Tube	Of Tube and Water
3/8	0.450	0.500	0.025	0.196	0.159	0.037	0.145	0.069	0.214
1/2	0.569	0.625	0.028	0.307	0.254	0.053	0.204	0.110	0.314
3/4	0.811	0.875	0.032	0.601	0.516	0.085	0.328	0.224	0.552
1	1.055	1.125	0.035	0.993	0.874	0.119	0.465	0.379	0.844
1 1/4	1.291	1.375	0.042	1.48	1.31	0.17	0.682	0.569	1.251
1 1/2	1.527	1.625	0.049	2.07	1.83	0.24	0.94	0.83	1.77
2	2.009	2.125	0.058	3.55	3.17	0.38	1.46	1.35	2.81
2 1/2	2.495	2.625	0.065	5.41	4.89	0.52	2.03	2.12	4.15
3	2.981	3.125	0.072	7.67	6.98	0.69	2.68	3.03	5.71
3 1/2	3.459	3.625	0.083	10.32	9.40	0.924	3.58	4.08	7.66
4	3.935	4.125	0.095	13.36	12.15	1.21	4.66	5.23	9.89
5	4.907	5.125	0.109	20.63	18.90	1.73	6.66	8.20	14.86
6	5.881	6.125	0.122	29.45	25.15	2.30	8.92	11.78	20.70
8	7.785	8.125	0.170	51.83	47.58	4.25	16.5	20.7	37.2
10	9.701	10.125	0.212	80.46	73.88	6.58	25.6	32.1	57.7
12	11.617	12.125	0.254	115.47	105.99	9.48	36.7	46.0	82.7

Nominal Dia., In.	Circumference, Inches		Sq. Ft. of Surface per Lineal Foot		Contents of Tube per Lineal Foot		Lineal Feet to Contain		
	Outside	Inside	Outside	Inside	Cu. Ft.	Gal.	1 Cu. Ft.	1 Gal.	1 Lb. of Water
3/8	1.570	1.413	0.131	0.118	.00110	.00823	909	122	14.5
1/2	1.963	1.787	0.164	0.149	.00176	.01316	568	76.0	9.09
3/4	2.748	2.547	0.229	0.212	.00358	.02678	379	37.3	4.47
1	3.533	3.313	0.294	0.276	.00607	.04540	164.7	22.0	2.64
1 1/4	4.318	4.054	0.360	0.338	.00910	.06807	109.9	14.7	1.76
1 1/2	5.103	4.795	0.425	0.400	.01333	.09971	75.02	10.0	1.20
2	6.673	6.308	0.556	0.526	.02201	.16463	45.43	6.08	0.727
2 1/2	8.243	7.834	0.688	0.653	.03396	.25402	29.45	3.94	0.471
3	9.813	9.360	0.818	0.780	.04847	.36256	20.63	2.76	0.330
3 1/2	11.388	10.867	0.949	0.906	.06525	.48813	15.33	2.05	0.246
4	12.953	12.356	1.080	1.030	.08368	.62593	11.95	1.60	0.191
5	16.093	15.408	1.341	1.284	.13125	.98175	7.62	1.02	0.122
6	19.233	18.466	1.603	1.539	.18854	1.410	5.30	0.709	0.849
8	25.513	24.445	2.126	2.037	.33044	2.472	3.03	0.405	0.484
10	31.793	30.461	2.649	2.538	.51306	3.838	1.91	0.261	0.312
12	38.073	36.477	3.173	3.039	.73569	5.503	1.36	0.182	0.217

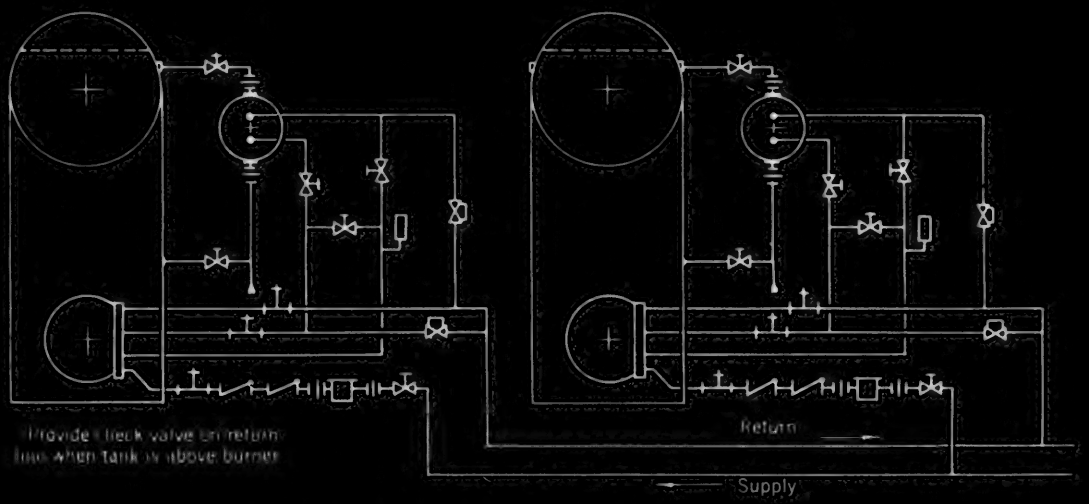
EXCESS AIR AS SHOWN BY CO_2 IN FLUE GAS-VARIOUS FLUES



PIPING FOR INDUSTRIAL OIL BURNERS



PIPING FOR TWO INDUSTRIAL OIL BURNERS AND TWO OIL LINE HEATERS. SEE REVERSE SIDE FOR CIRCULATING PUMP PIPING



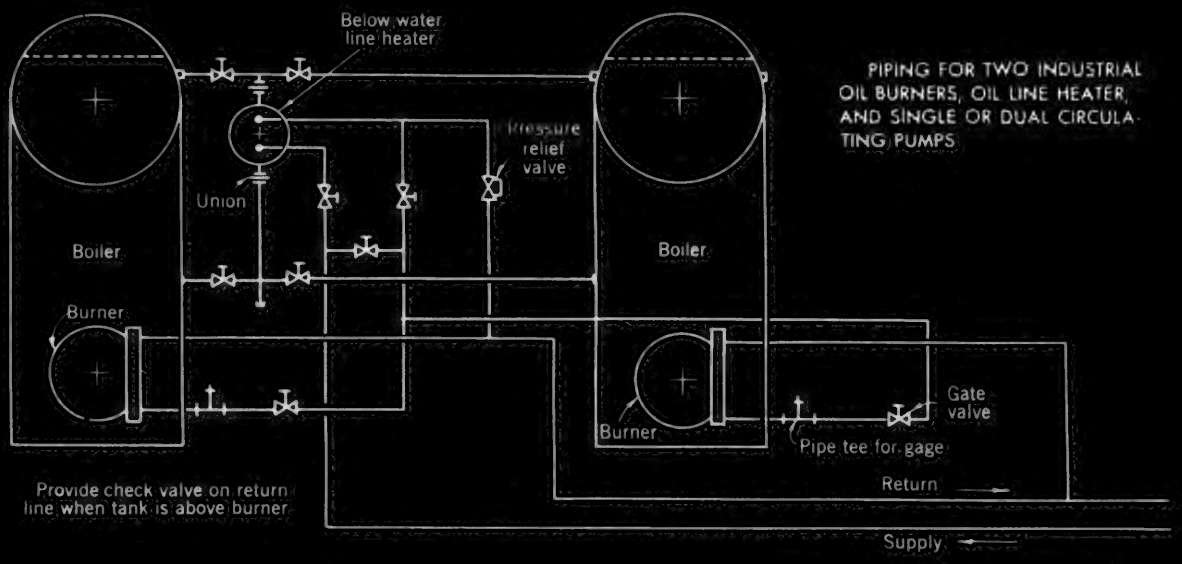
PIPING FOR TWO INDUSTRIAL OIL BURNERS AND TWO OIL LINE HEATERS

DRAWINGS THROUGH THE COOPERATION OF IRON FIREMAN MANUFACTURING CO.

AIR CONDITIONING, HEATING AND VENTILATING'S DETAIL SHEET

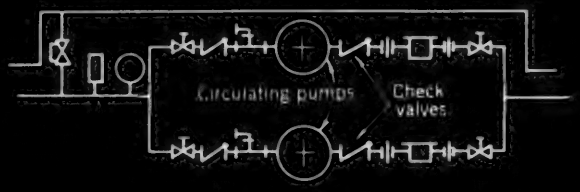
CUT ALONG THIS LINE

PIPING FOR INDUSTRIAL OIL BURNERS



PIPING FOR TWO INDUSTRIAL OIL BURNERS, OIL LINE HEATER, AND SINGLE OR DUAL CIRCULATING PUMPS

PIPING FOR ONE CIRCULATING PUMP



PIPING FOR TWO CIRCULATING PUMPS

ACH&V's *Ad-Digest* AND PRODUCT INFORMATION SERVICE

Below and on the following pages are given brief digests of the advertisements appearing in this month's issue. Use this Digest to locate and refer to the advertisements in which you are particularly interested, then fill out and mail the prepaid postcard to request further information from manufacturers.

The items appear in the same order as the advertisements to which they refer, to facilitate obtaining further information after reading an advertisement.

NOTE: All advertisements are digested here except those received too late for inclusion. The Index of Advertisers lists all the advertisements in this issue.

Use the postcard below for catalogs, new equipment and materials, as well as Ad-Digest items.

PIPE HANGERS AND SUPPORTS. Inside front cover. A complete line of pipe hangers and supports is supplied through a coast-to-coast system of strategically located warehouses and jobbers by this manufacturer. The company maintains a staff of trained personnel, ready to work with customers on the job. ....**Item 99**

EXHAUST FANS. Page 1. A direct-driven fan is made by this firm in a divided housing so that fumes bypass the motor. The fan installs like a section of duct work, vertically, horizontally, or at an angle. A bulletin containing complete data on the exhaust fan is available. ....**Item 100**

PACKLESS CONTROL VALVES. Page 2. Packless control valves are available from this manufacturer for convectors, unit air conditioners, unit ventilators, radiators, panel heating, and cooling coils. No packing nut or gland needs to be tightened, oiled or adjusted. Bulletin is available. ....**Item 101**

AIR-COOLED CONDENSER. Page 4. Air-cooled condensers for waterless air conditioning and refrigeration are available from this company in sizes from 2 to 20 tons. Condensers have a dimpled fin that gives 15% added heat transfer. Bulletin is available. ....**Item 102**

WROUGHT IRON. Page 9. Thousands of fibers of silicate gathered in the mixing operation and distributed through the body of iron protect wrought iron from corrosive attack. A booklet is available describing the processing and properties of wrought iron. ....**Item 103**

FLUSH VALVES. Page 11. Flush valves of the diaphragm type, made by this company, were selected for use in a 25-story San Francisco skyscraper. A handbook with 19 pages of installation details for exposed, concealed, and special flush valve installations and charts, formulae, and piping details is available. ....**Item 104**

HEAT EXCHANGERS. Page 13. This manufacturer of heat exchangers offers the results of experience, production facilities, materials testing and design research, and the guidance of its engineering staff, at the plant and in the field to provide practical solutions to heat exchange problems. Information is available. ....**Item 105**

INDUSTRIAL EXHAUSTER. Page 14-15. A taper lock hub assembly on this company's industrial exhauster permits changeovers on heavy duty applications where periodic wheel replacement is anticipated. The exhauster has a heavy duty shaft and bearings, has rotatable discharge positions, and its rotation is reversible. Literature is available. ....**Item 106**

AIR CLEANER. Page 16. The filter medium of these air cleaners carries a permanent, electrostatic charge that attracts and captures fine dirt particles. It also permits depth-loading and can be maintained by washing. The air cleaner can be used with any forced air heating or cooling system using panel filters. Details are available. ....**Item 107**

CONDENSING UNITS. Between 16-17. A line of open-type refrigeration and air conditioning condensing units from ¼ through 100 hp is available from a single manufacturing source. Semi-hermetic condensing units are available from ¼ to 3 hp; packaged air conditioners are made in 3, 5, 7½, and 10-hp models. Information is available. ....**Item 108**

HEATING-COOLING LINE. Pages 17 to 24. The line of heating, cooling, and ventilating equipment offered by this company includes centrifugal water chillers to 800 tons, packaged air conditioners, individual room air conditioners, convectors, space unit heaters, and unit ventilators. Information is available. ....**Item 109**

FITTINGS AND FLANGES. Between 24-25. This company's line of welding fittings and flanges are made to meet all U. S. piping code specifications. The line includes carbon, stainless, and chrome-moly steels, wrought iron, aluminum, copper, brass, Monel, Inconel and nickel piping materials. Application data for wrought iron fittings is available. ....**Item 110**

REFRIGERANTS. Page 25. The refrigerants manufactured by this company are non-corrosive to standard equipment materials, have critical and freezing points outside the range of operating uses, are miscible with oil, and are interchangeable with comparable fluorinated hydrocarbon refrigerants. Information is available. ....**Item 111**

INSULATION. Page 26. Aluminum-faced fiber glass insulation is made by this company for manufacturers and installers of furnaces, air conditioners, or related duct-work. The insulation is installed by applying glue and pressing the insulation on to the panel to be insulated. Bulletins are available. ....**Item 112**

THERMO VALVES. Page 27. No torch, tube cutter, or sawing are required to service this manufacturer's thermo valves on a cooling system. For cleaning, repair, or capacity change, loosen two screws, raise the power element and lift out the cage. ....**Item 113**

INDIVIDUAL ROOM CONTROL. Page 28. Individual room control is achieved in a new motor court by a system consisting of this company's room thermostat, a motor-operated valve on each room unit, and a master summer-winter switch in each building for changeover from heating to cooling. Bulletin is available. ....**Item 114**

GENERAL PURPOSE FAN. Page 29. General purpose fans are made in three types and eight basic sizes with capacities from 1200 to 19,000 cfm. These include both direct connected and belt driven models. Fan bulletins are available. ....**Item 115**

MOTOR CONTROLS. Page 30. Motor controls for refrigeration and air conditioning equipment are made by this manufacturer with no hinges or pivots to bind, no pins or bearings to wear, and the cadmium silver alloy contacts do not need cleaning, filing or dressing. Both solenoid starters and overload relays are made by the company. Literature is available. ....**Item 116**

ANTI-CORROSION LININGS. Page 31. Linings of plastic, rubber, lead, copper, and cement are available from this company to solve corrosion problems in storing and processing water, acids, beverages, foods and most chemicals. The linings are available with the company's unfired pressure vessels. Reference catalog is available. ....**Item 117**

INQUIRY CARD

Circle below item numbers on which you wish catalogs or further information.

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Ad-Digest

AND PRODUCT INFORMATION SERVICE

PACKAGED AIR CONDITIONER. Page 32. Ceiling-mounted, packaged air conditioners in air-cooled models are available in 3-and 5-ton capacities from this manufacturer. Water-cooled models are available in 3, 5, and 7½-ton capacities. The units may be equipped with coils for winter heating. Booklet is available. **Item 118**

CONDENSATION PUMPS. Page 33. The line of condensation pumps offered by this manufacturer includes a vertical pump, a duplex unit with two float switches, a pump designed for below floor level returns, a pump for pressures from 10 to 75 lb, and a high pressure turbine for pressures to 150 lb and boilers to 250 hp. A bulletin describing each pump is available. **Item 119**

COPPER WATER TUBE. Page 34. Copper water tube is used exclusively for the chilled water supply and return lines of this hotel's air conditioning system. Type L copper tube is available in ¼ to 12-in. sizes in 20-ft lengths. Gate valves are also available from the manufacturer of the tube. Information is available. **Item 120**

INSULATION BOOKLET. Page 35. An 8-page brochure on duct insulation and duct liner shows how to solve duct liner equations without a slide rule. Offered by this manufacturer of thermal and acoustical glass fiber insulations, the booklet contains specifications and instructions for insulating heating, cooling, or combination ducts, forming duct liners, and applying surface finishes. **Item 121**

DEALER PLAN. Page 36-37. For every ton of this company's packaged air conditioning handled, a dealer will receive 800 points. The points can be redeemed for any of a thousand items. It is not a contest but a bonus for dealers of this company's packaged air conditioners. Information is available. **Item 122**

VALVES AND FITTINGS. Page 38. Complete lines of bronze valves and fittings are made by this company in four distinct pressure ranges from 0 to 5000 psi working pressure. The valves and fittings are being used at temperatures as low as —350 deg F. They have factory inserted rings of silver brazing alloy. Circular is available. **Item 123.**

AIR CONDITIONING CONTROL. Page 39. A complete control system is made by this company for year-round air conditioning systems. The control system consists of a thermostat, a function selector, and a universal control panel, prewired with high voltage and low voltage terminals. Information is available. **Item 124**

ELECTRIC MOTORS. Page 40. Special and standard electric motors are available from this company in sizes from 1/30 to 5 hp to meet customers' needs. Castings, windings, and mountings can be adapted to solve new design problems at minimum costs. Bulletin is available. **Item 125**

AIR CONDITIONING LINE. Page 41. The line of air conditioning and refrigeration equipment, made by this company, consists of packaged air-cooled conditioning units, packaged liquid chillers, condensing units, air handling units, and cooling towers and evaporative condensers to match. Information is available. **Item 126**

STEEL PIPE. Page 44. More than 60 years in hot water and steam heating applications recommended the use of steel pipe for snow melting, ice removal, heating, plumbing, fire sprinkler systems, power, steam and air transmission. A 32-page booklet on snow melting and ice removal systems is available. **Item 127**

AIR-COOLED CONDENSERS. Page 45. Air-cooled condensers are made by this company in capacities up to 20 tons, arranged with either blower fan or propeller fan, to permit air conditioning and refrigeration systems to operate without water. The company's line also includes cooling towers, evaporative condensers, propeller fan condensers, and pressure stabilizers. Information is available. **Item 128**

AIR CONDITIONING EQUIPMENT. Pages 46-47. This company's line of air conditioning equipment includes centrifugal refrigerating machines, heating and cooling coils, self-contained air conditioners, sprayed coil dehumidifiers, high pressure fans, multi-zone units, central station units, motor-driven conditioners, and high and medium pressure inductor unit. Information is available. **Item 129**

FILTER-DRIERS. Page 48. Filter-driers are made with a molded porous core by this company with tri-dimensional filtering areas so that refrigerant cannot bypass or channel around them. Corrosive acids are absorbed and retained within the cores themselves. They are available in sizes from 3 to 192 cu in. in flare or sweat connections. Bulletin is available. **Item 130**

SEAMLESS COPPER TUBE. Page 49. Seamless copper tube and pipe is fabricated by this manufacturer to resist everything except flow. The tube and pipe are made with smooth surfaces inside as well as outside. Information is available. **Item 131**

ROOF EXHAUSTERS. Pages 50-51. A U-spring cushion suspension mounting cuts vibration and lowers the noise level of this company's power roof exhausters. A new design in fan blade and housing reduces air velocity. Each unit is individually checked under simulated operating conditions. Information is available. **Item 132**

ELECTRIC MOTORS. Page 52. This line of electric motors features corrosion-resistant cast iron frames with the motor feet cast as an integral part of the frame. Enclosures are drip-proof. The motors are engineered to meet the re-rated NEMA specifications for smaller frames. Information and dimensions are available. **Item 133**

ROOM AIR CONDITIONERS. Page 53. Individual room air conditioners that heat with hot water and cool with cold water are made by this company in console, concealed, built-in overhead, and exposed ceiling models in sizes to meet construction requirements. A 1/30- to 1/12-hp motor operates two fans in each unit. Bulletin is available. **Item 134**

STEEL PIPE. Page 54. You get quick service when you order steel pipe from this company's distributor. His complete stock makes it unnecessary for you to carry excess pipe inventory, or put up with costly job delays because of lack of pipe. **Item 135**

UNDERGROUND PIPE INSULATION. Page 55. This triple-zone, hot underground pipe insulation consists of an inner semi-plastic core fused on by the pipe's heat, a middle sintered zone of particles, and a final zone of granule thermal insulation. It is installed by pouring, tamping down, and back filling. Information is available. **Item 136**

DRAFT CONTROLS. Page 56. Draft controls for coal and oil-fired heating plants are heavy-duty, commercial models in 28- and 32-in. sizes. They are also available in 6-to 24-in. sizes for domestic and commercial installations. Controls for gas and gas-oil fired heating plants are also made in sizes 8- through 32-in. **Item 137**

UNDERFEED STOKERS. Page 57. Single retort, underfeed stokers reduced the cost of steam per thousand pounds in one steam plant. A master regulator is connected to the adjustable feed control on each stoker and to the adjustable damper of each motor-driven fan to regulate fuel and air mixtures. Bulletins are available. **Item 138**

AIR DIFFUSERS. Page 58. Square and rectangular units with built-in diffusing vanes are made by this company in unlimited air patterns. Slot diffusers are available in sections or are supplied as continuous decorative units. Engineering data is available. **Item 139**

REVERSIBLE ROOF VENTILATOR. Page 59. A reversible roof ventilator is made by this company with 28-, 36-, and 44-in. fan diameters in a capacity range for exhaust, from 6800 to 23,600 cfm and for intake from 6520 to 22,300 cfm. Available in curve, peak, or slope base construction, the ventilator is made of 20-gage galvanized steel. Bulletin is available. **Item 140**

HEATING SPECIALTIES. Page 60. A new Chicago skyscraper is equipped with this manufacturer's valves, traps, and gages. The company's line of heating specialties consists of radiator valves and traps, pressure gages, and float traps. Information is available **Item 141**

MOTOR COMPRESSOR. Page 61. A 10-hp motor-compressor has been introduced by this company for packaged air conditioning. The use of suction cooling and Freon-22 give the unit high capacities with low power input. Adjustments and parts replacement can be made on the spot. An engineering packet is available. **Item 142**

STEEL PIPE. Page 62. Almost 200 tons of this fabricator's steel pipe was installed in a new Chicago office building. Approximately 120 tons were employed as air conditioning carriers, about 42 tons were used for heating and fan rooms and about 20 tons were used in the building's plumbing system. Engineering assistance with pipe problems is offered. **Item 143**

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AIR CONDITIONING, HEATING AND VENTILATING

93 WORTH STREET

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AD-DIGEST SERVICE

RECESSED ROOM UNITS. Page 64. Thermostatically-controlled, recessed room air conditioners are made by this firm to heat with steam or hot water in commercial and institutional buildings and to cool with their own air-cooled, 1-hp refrigeration cycle. When installed, the units are flush outside and compact inside. Bulletin is available. ----------**Item 144**

BALL BEARINGS. Page 65. This line of ball bearings for heating and air conditioning equipment includes ball bearings designed to take the place of sleeve bearings, rubber cylindrical cartridges, rubber-cushioned pillow block bearings, and a complete line of ball bearings with other types of rubber housings. Bulletin is available. ----------**Item 145**

TEMPERATURE REGULATORS. Page 66. These regulators are guaranteed to shut tight when the demand for steam ceases. Expensive steam leaks due to a lack of tight shutoff are eliminated. Bulletin available. ----------**Item 146**

REGISTERS AND GRILLES: Page 67. This company's line of registers and grilles includes perimeter baseboard diffusers, perimeter baseboard registers, perimeter floor registers, and ceiling air diffusers. Catalog is available. ----------**Item 147**

RIB-TYPE MOTORS. Page 68. A complete line of rib-type motors from 1 to 100-hp is offered by this manufacturer. The rib-type design provides reserve cooling capacity in dirty locations. Large grease reservoirs surround the motor's bearings. Information is available. ----------**Item 148**

PACKAGE LIQUID COOLER. Page 69. A packaged liquid cooler is offered by this manufacturer with capacities from 7½ to 100 tons. The evaporator is under the compressor; pump-down is non-recycling; and wiring is complete. Stock pumps and cooling components are available for immediate shipment. Catalog is available with data on liquid cooler. ----------**Item 149**

HEATING PUMPS. Page 70. In a heating pump, silence is golden. This line of heating pumps includes a size for every type of heating job, including vacuum and boiler feed pumps and condensation pumps and receivers. Bulletins for each pump in the line are available. ----------**Item 150**

BOILER FIRING UNITS. Page 71. This boiler firing unit is a package that includes an oil or gas burner, or combined gas-oil; a factory-wired control panel; forced draft air supply; and a built-in fuel system all in a single integrated unit. It is a complete combustion system. Information and specifications are available. ----------**Item 151**

HEATING AND COOLING LINE. Between 72-73. A complete line of hot water and steam heating products and air conditioning equipment is offered by this company in all types and sizes for residential, institutional, commercial, and industrial structures. Boilers, heat distributors, air conditioners, conversion burners, and unit heaters are included in the line. Literature for each product in the line is available. ----------**Item 152**

HEATING-COOLING CONTROL. Page 73. This company's line of heating and cooling controls provide temperature and humidity control in hospitals. Individual room thermostats, humidistats, valves, dampers, and other controllers regulate the basic operation of the heating and air conditioning equipment of hospitals and other types and sizes of building. Information is available. ----------**Item 153**

VALVES. Page 74. Valves with special features for handling light oils, gases, and volatile fluids are made by this manufacturer with a composition disc soft enough for type seating yet stiff enough for hard wear. The stuffing box has molded asbestos packing. Information is available. **Item 154**

FINNED HEATING TUBES. Page 75. Copper tubing with aluminum fins is made by this company for radiant panel heating. Installed at right angles to ceiling joists, the coil sections distribute heat to the ceiling and floor surfaces. A line of baseboards is also available from the company. Information is available. ----------**Item 155**

AIR CONDITIONING SYSTEMS. Page 76. The air conditioning systems designed by this company are backed by 21 years of engineering experience and a nation-wide network of personnel. The company designs air conditioning and heating systems for homes, business, and industry. Information is available. ----------**Item 156**

SHOWER CONTROL. Page 77. A shower control is made for concealed and exposed piping by this company to prevent the flow of water to a shower above 110 deg F. It maintains the shower temperature regardless of temperature or pressure changes in the water supply. It is often used with shower heads having built-in volume control. Bulletin is available. ----------**Item 157**

AIR FILTER SERVICE. Page 78. This manufacturer offers to send a field engineer who is an air filtration expert, to analyze air filters and submit a factual, written report on his findings. The company makes this service available on a no cost basis because it will point out the importance of buying standard brand filters. Information on service is available. ----------**Item 158**

INTEGRAL-FURNACE BOILERS. Page 79. Integral-furnace boilers are available from this manufacturer in standard sizes for loads to 40,000 lb per hr at steam pressures to 235 psi. Many are in operation at higher pressures and with moderate superheat. Bulletin with detailed description is available. ----------**Item 159**

LIQUID CHILLERS. Page 81. The two 150-ton air conditioning units in New York's glass bank are equipped with this manufacturer's dry expansion Freon chillers. The chillers each supply blowers with 331 gpm of water, chilled from 50 to 40 deg F. A catalog containing information on the units is available.----------**Item 160**

RADIANT HEATING OF CHURCH. Page 145. Five thousand feet of copper water tube in sizes ranging from ¾ to 1½ in. were used in the radiant panels of this church. Only one solder or compression fitting was needed every 60 ft. Technical advisory service available. ----------**Item 161**

COAL FUEL. Page 147. One firm replaced an outmoded installation with a 289,000-lb. per hr boiler fired with pulverized coal and revamped the rest of its power system to economize on costs of operation. Automatic coal and ash handling systems can cut labor costs. Case histories on how plants have saved money burning coal are available. ----------**Item 162**

Use this digest to locate and refer to items and advertisements appearing in this issue, then fill out and mail the prepaid postcard to request further information.

AIR CONDITIONER. Page 149. An air conditioner is offered by this company for connection to remote, direct expansion or chilled water cooling systems, or to remote hot water systems. A duct type is made for residential, commercial, and small industrial buildings, and a ductless type is made for offices, stores, motel lobbies, and restaurants in 2- and 3-ton capacities. Bulletin and price list are available. ----------**Item 163**

HEATING-COOLING EQUIPMENT. Page 151. A heating and ventilating system for schools can be made up of three primary parts from this company's equipment. Room units concealed in wall spaces, a central heating and ventilating unit, and finned-pipe radiation along the walls make up the three primary parts of the system. Literature is available. ----------**Item 164**

PROPELLERS. Page 155. Carbon and stainless steel propellers are produced by this manufacturer in a size range of 24 to 144 in. ¼ to 200 hp, and with a capacity range from 3500 to more than 450,000 cfm. Assistance in air delivery problems is available. ----------**Item 165**

ICE BANKS. Page 155. Sweet water ice banks are designed by this manufacturer to deliver tons of 32- to 34-deg F ice water for recirculation through air cooling coils in air conditioning systems. Designed for use with Freon, methyl chloride, or ammonia, the banks may be added to existing systems for increased capacity. Catalog is available. ----------**Item 166**

IMPULSE STEAM TRAP. Page 157. A line of sizes and types of impulse steam traps are available for every requirement from this company. The traps are good for all pressures without change of valve or seat; have only one moving part; are made of stainless steel; and are available from 270 local industrial distributors. A 24-page bulletin is available. ----------**Item 167**

CONTROL VALVES. Page 159. This company's valves insure control of water, steam, gas or oil. They are engineered, designed and manufactured to the standards of the industry. The valves are made in a complete line of bronze and iron bodies. The valves were recently installed in a modern office building. Brochure available. ----------**Item 168**

Circle numbers corresponding to the items and advertisements in which you are interested, print your name and address clearly. Information will be sent directly from manufacturers.

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INFORMATION SERVICE

VENTILATORS. Page 159. Twenty-nine of this company's 72-in. fan ventilators with individual capacities of 81,000 cfm exhaust large volumes of fumes and heated air from a steel plant during certain operations and lesser amounts during others. A data book on the company's line of roof ventilators is available. ----------**Item 169**

AIR COOLING EQUIPMENT. Page 161. Air-cooled condensers for inside or outside installations and a line of air cooling coils from 2- to 15-ton capacities are available from this manufacturer. Four-row coils are made for residential jobs and 6-row coils for commercial jobs. Engineering service and details are available. ---**Item 170**

STEAM DISTRIBUTORS. Page 161. Steam distributors with trombone-shaped tubes are made by this company so that two adjacent condensing tubes are served from a single supply header connection. The distributor is made for heating and ventilating applications with modulating valve control and for preheating outdoor air. Publication is available. ----------**Item 171**

POWER ROOF VENTILATORS. Page 163. Power roof ventilators have advanced modern design to fulfill architectural styling and job performance requirements. The ventilators are made with air capacities from 550 to 65,000 cfm and with belt or direct drives. A booklet is available that gives the design, construction, and performance data of the ventilators. **Item 172**

WATER HAMMER ABSORBERS. Page 163. The pounding and noise caused by water hammer is prevented by the shock absorbers manufactured by this company. Installed in pipe lines, the absorbers prevent loosening fittings, damaging valves and appliances. Manual on water hammer is available. ----------**Item 173**

BULLETIN ON COOLING. Page 163. An engineering booklet describing a complete line of commercial and industrial cooling equipment is offered by this manufacturer for air conditioning, ice making, quick freezing or other refrigerating work. ----------**Item 174**

ROOF VENTILATORS. Page 165. A complete range of units and sizes for every ventilating problem is offered by this manufacturer of roof ventilators. The ventilators are available for supply or exhaust purposes. Information is available. ----------**Item 175**

DIRECT-FIRED HEATERS. Page 165. Direct-fired heaters for gas, oil, or combination fuels are available in 6 models and 66 sizes from 200,000 to 2,000,000 Btu per hr capacities from this manufacturer. The heaters are wired, assembled, and flame-tested at the factory. Complete information and specifications are available. ----------**Item 176**

BOILER WATER LEVEL CONTROLS. Page 166. A permanent Alnico magnet is located outside the float chamber of these boiler water level controls. Units are available for temperatures to 750 deg F and pressures to 600 psi for single stage or multi-level stage service with as many as three separate switching actions. Catalog is available. ----------**Item 177**

MATERIALS HANDLING FANS. Page 167. Designed primarily for use in conveying materials, the fans are also effective for dust, fumes, and gas removal. Available in 19, 26, 33, 40 and 51-in. wheel diameters, the units are adjustable for angular, horizontal, or vertical air discharge and reversible for clockwise or counter-clockwise rotation. Folder available.---**Item 178**

SECTIONAL CONDENSER. Page 167. A sectional condenser for removing superheat and condensing gas at lower temperatures is offered by this manufacturer. The system is automatically purged of oil and it transfers the heat to the outdoor air by evaporation. The capacity range of the condenser is 90 to 240 tons. Bulletin is available. ----------**Item 179**

ELECTRIC HEATERS. Page 167. Electric comfort heaters for low cost space heating are made in a choice of blower, convection, or radiant types with totally enclosed heating elements by this manufacturer. The heaters are also made in portable, mounted, or built-in units from $\frac{1}{4}$ to 40 kw with automatic or manual controls. Catalog of the entire line of heaters is available. ----------**Item 180**

INTERIOR FIRE PROTECTION. Page 170. Interior fire protection equipment is offered by this manufacturer with accurate quotations from its factory, delivery as promised, and quick installations. The company makes an entire line of equipment. Information is available. --**Item 181**

AIR RECOVERY. Page 171. Air recovery when part of an air conditioning or ventilating system can reduce, sometimes by as much as two-thirds, the amount of outside air that has to be taken in by passing stale air through beds of activated carbon, removing gaseous and odorous impurities. Information is available. ----------**Item 182**

AUTOMATIC SHUTTER. Page 173. An automatic shutter for unit blowers is self-contained in an adapter sleeve for attachment to the blower. Weather stripped, the shutter has light gage aluminum louvers with felt silencer strips. Catalog, circular, and prices are available. ----------**Item 183**

DAMPER HARDWARE. Page 173. A kit of damper hardware is offered by this company for making non-binding louver dampers. Less skilled labor is required, for little care is needed and no alignment is necessary afterward. Only the frame and blades must be made. Information is available. ----------**Item 184**

INDUSTRIAL SPACE HEATERS. Page 173. Industrial space heaters manufactured in sizes from 300,000 to 2,000,000 Btu per hr output for gas, oil, or dual gas and oil firing. Completely automatic in operation, the heaters have a stainless steel combustion chamber and a separate draft fan; other applications include make-up air, drying adaptations, high temperature, and process work. ----------**Item 185**

UNIT COOLERS. Page 173. Large capacity unit coolers are designed by this company to deliver full rated capacity in order to reduce the number of units required and eliminate extra piping and electrical connections. Units are made to operate at all normal temperatures. Information available. ----------**Item 186**

PACKAGE CHILLERS. Page 174. Package chillers are made to meet the requirements of residential, commercial, institutional, or industrial installations by this manufacturer. The chillers have completely non-ferrous water passages to guard against corrosion. Bulletins describing the various chillers made by the company are available. ----------**Item 187**

COOLING TOWERS. Page 175. To cool the large compressors in Chicago's Hotel LaSalle, one of this company's 350-ton cooling towers was installed. The company's line of forced and natural draft cooling towers is available in capacities from 3 to 1000 tons. To help select the right type and capacity tower, one of the company's engineers will submit proposals without obligation. Details are available. ----**Item 188**

DUCT FANS. Page 176. Straight-line, vaneaxial, and elbow type duct fans are made by this company in a wide variety of sizes and capacities to handle cold, dust-laden, or corrosive air or gases and for exhausting or supplying air. Bulletin is available. ----------**Item 189**

DRINKING WATER COOLERS. Page 177. Drinking water coolers from low-height models for school children to explosion-prof models for combustible atmospheres are made by this company. The coolers have hand-and-foot flow control and double thermostats to prevent mechanical freeze-ups. Information, sample guarantee, and name of distributor are available. ----------**Item 190**

HEAVY-OIL BURNER. Page 178. Oil burners designed for heating buildings that require more than 6000 gallons of oil or 45 tons of coal per year will burn commercial No. 4 or 5 heavy oils. Conversion is simple; the burner fits all types of standard heating boilers. Illustrated bulletin available for those who own, specify, install, or service burners. ----------**Item 191**

ENGINEERING ASSIGNMENTS. Page 179. Diversified, original assignments are offered by this company to graduate, heating and ventilating engineers with 4 or more years design experience. Successful applicants will design systems required in chemical product manufacturing. Send complete resume. ----------**Item 192**

DAMPER CONTROL. Page 180. Damper controls made by this manufacturer for induced draft installations have four control features: a starting draft selector; automatic draft modulation; automatic sequence operation; and low draft cutoff. Information is available. ----------**Item 193**

RELIEF VALVES. Inside back cover. Relief valves for Freon and similar refrigerants and for ammonia are constructed in accordance with the standards of the ASME. They are made in straight-through and angle types. In addition, the valves are stamped NB to indicate National Board Certification of their capacities. Data sheet showing capacity ratings is available. ----------**Item 194**

BOILER RELIEF VALVES. Back cover. A series of relief valves for hot water space heating boilers is made by this company with sizes to 1,448,000 and to 1,928,400 Btu per hr. The smaller valve opens at 30 psi, the larger at 36 psi. Complete information is available. ----------**Item 195**

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AIR CONDITIONING, HEATING AND VENTILATING

93 WORTH STREET

NEW YORK 13, N. Y.

AD-DIGEST SERVICE

What Would You Do?

Replies to engineering and operating problems of interest to the industrial plant engineer

Conducted by
NATHAN N. WOLPERT
Associate Editor

MOTORS are an exceedingly important part of every industrial plant and any device or practice that will prolong the life of these units, is looked upon with considerable favor.

This problem and the one scheduled for discussion next month are printed on this page. Should you have comments that you would like to add to next month's discussion or if you have a problem that you would like to see treated here, write to the editor.

This Month's Problem

Because of the increase in motor costs, it is most important to us that the motors be properly protected against overload. Without becoming too involved in power principles, what is required for motor protection for both integral and fractional horsepower motors?

Discussion of the Problem

An overflow on a motor is the flow of higher than normal current through its stator. This may be caused by excessive mechanical load on the motor up to the stall point, by line voltage being below the rated value, or by single-phasing, that is, the loss of one of the primary phases. The increased current flow causes overheating of the motor winding, which may damage the motor by failure of the insulation or by open-circuiting internal connections in the motor. Any overheated motor represents a fire hazard.

Two overload relays, one in each of two phases, are required by the National Electrical Code for protection of three-phase or two-phase motors. If the overload is caused by excessive mechanical load or by low line voltage, overcurrent flows in all primary phases. If the overload is caused by single-phasing, excessive current flows in two lines to the motor. Hence, at least one of the two overload relays carries the overcurrent. There are some special cases when wye-delta or delta-wye connected transformers feed the motor circuits on a three-phase system, and where loss of one primary transformer phase is likely to occur. In such a case, only one motor phase may carry excessive current and three overload relays, one in each line, may have to be used. Such a requirement is not likely to come up in a metropolitan area, but it may come up on a rural pumping job where power to the motor load may be brought over a vulnerable line.

Good protection allows the motor to carry any load, including an overload, just long enough so it will not overheat; but the motor should be disconnected as soon as it reaches its ultimate safe temperature. Small motors, especially, fractional horsepower motors, which are built in large quantities for specific purposes, are equipped with inherent overheating protective devices which are imbedded in the motor windings and respond directly to the heat generated within the motor. Such devices cannot be used economically on larger general purpose motors since it would be too expensive to develop inherent protective devices for all possible applications. Among starter manufacturers, as well as users, thermal overload relays are universally accepted as the most desirabe type.

Thermal overload relays are replica relays. They "see" the current flowing in the motor, and the heat generated within the relay which eventually causes the relay to trip, follows substantially the heating characteristic for a relay. The tripping time at slight overloads must be long enough to enable the motor to carry that overload for a safe period of time. When the motor stalls, however, it must be disconnected quickly, because at standstill the motor heats up much more rapidly than if it were running, with the same current flowing. Unfortunately, motor heating characteristics are not standardized, and overload relay design must, of necessity, be a compromise. Experience has shown that about 95% of all motors used on industrial applications are adequately protected by relays which follow or fall below the indicated trip curve.

Cost would be prohibitive if starter manufacturers would build a special relay for each value of motor current. Instead, a standard relay is used which covers a wide range of motor ratings, and a line of relay heaters is available to fit the relay to specific motor applications. In each starter, and in the manufacturers' catalogs, there are tables stating the range of motor current for which each heater gives adequate protections. The code allows heater selection on the basis of 125% motor current for 40C rise rated motors. When motors are employed which are rated for a temperature rise of 50C at rated load, heaters are selected on the basis of 100% motor current.

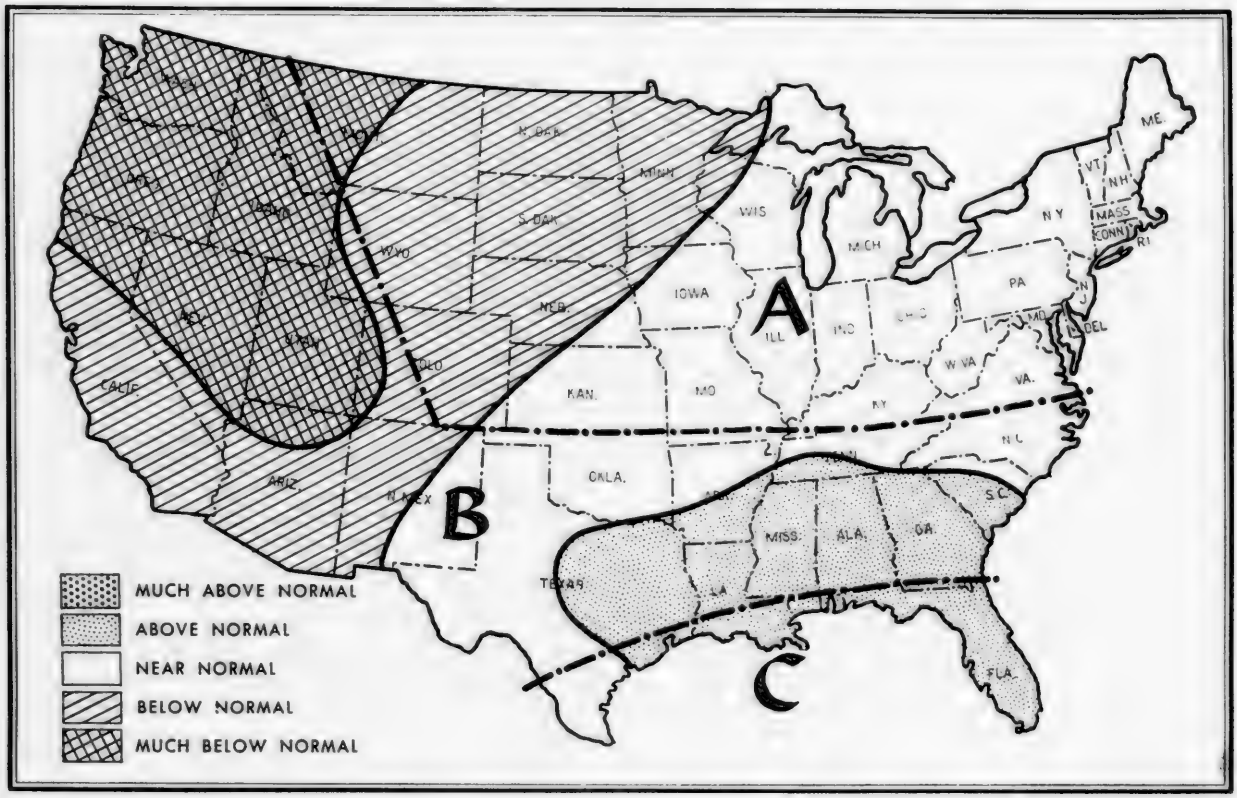
For this information, we are indebted to G. W. Heumann, Industry Control Department, General Electric Co., Schenectady, N. Y.

Problem for the Coming Issue

Although I have seen dry wells installed about a home to handle rain water from the roof, I would like information on the proper design of a dry well for an industrial plant, how to determine the size of the well, and what maintenance may be necessary.

Temperature Forecast for March

Prepared for Air Conditioning, Heating and Ventilating by Long Range Weather Consultants



KEY BY REGIONS

	A	B	C
NEAR NORMAL	+ 2° to − 2°	1° to 1°	− 1° to 1°
ABOVE NORMAL	+ 3° to + 5°	− 2° to + 4°	+ 2° to + 3°
BELOW NORMAL	− 3° to − 5°	2° to − 4°	2° to 3°
MUCH BELOW NORMAL	− 6° or more	5° or more	4° or more

MARCH promises to be a month of rather close to normal average temperatures in most of the eastern part of the country, but quite cold in the far west, particularly the northwest.

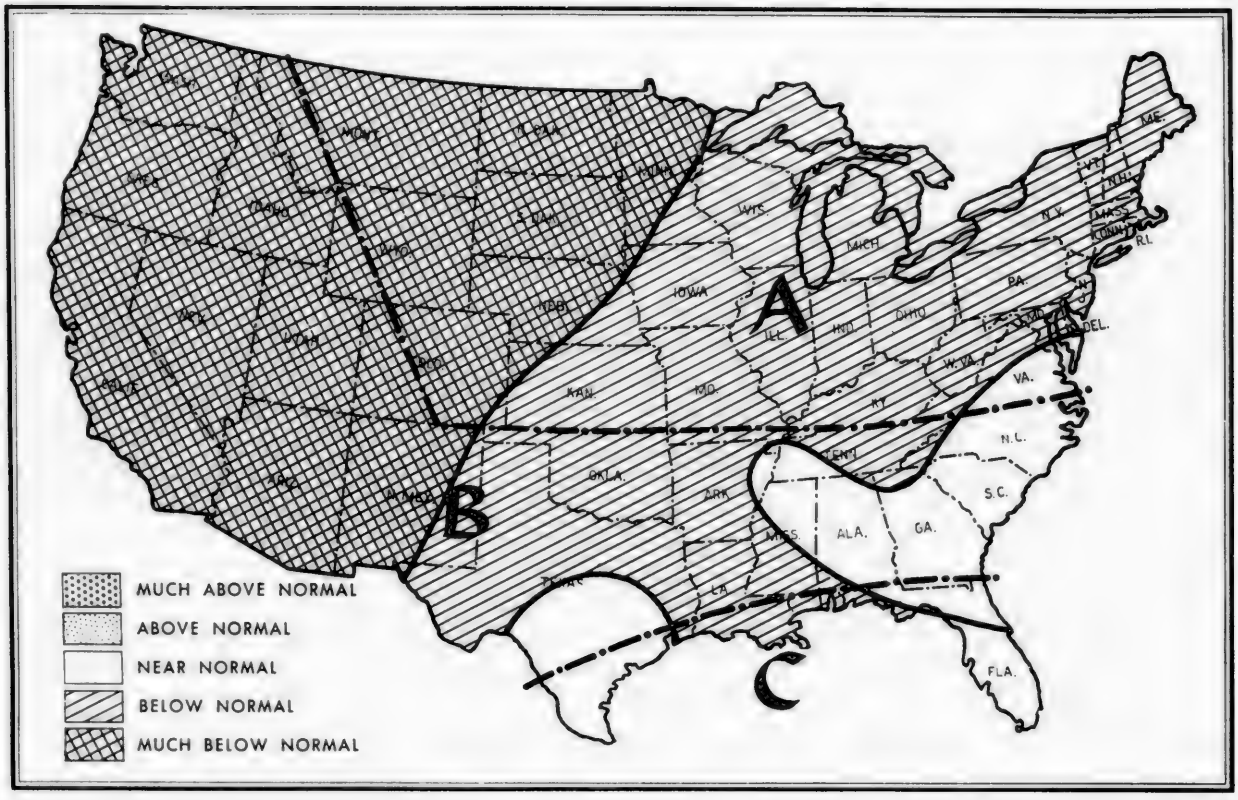
Average temperatures two degrees or more below normal will occur generally in all sections west and northwest of a line running from southwestern New Mexico to eastern Lake Superior. Much below normal temperatures, 5° to 10° below the normal, are expected generally west of the Divide from the Canadian border southward to western Colorado, Utah, Nevada and northern California. In most of this area the latter part of the month probably will be colder than the early part.

Over most of the country east of the southwest New Mexico-Lake Superior line March temperatures will average rather close to normal, within a degree or two of normal, except that from eastern Texas eastward through the Gulf states to the South Atlantic coast they will be moderately above normal, generally 2° or 3° above in most sections. In most of the eastern half of the country it is expected that the month of March will start quite cold, with temperatures well below normal, but with a strong warming trend appearing by approximately the middle of the month.

Temperature Forecast for Spring

A forecast for the March, April, May quarter, 1956

Prepared by Long Range Weather Consultants



KEY BY REGIONS

	A	B	C
NEAR NORMAL	+ 1° to − 1°	+ 1° to − 1°	0
BELOW NORMAL	− 2° to − 3°	− 2°	− 1°
MUCH BELOW NORMAL	− 4° or more	− 3° or more	− 2° or more

INDICATIONS are that the spring of 1956 will be a rather cold season over most of the country, but particularly so in the far west and northwest.

No section of the country is expected to average warm enough to be considered above normal this spring. Present indications are that spring temperatures will average close to normal, within one degree of normal, in southern Texas, and in a section of the southeastern states extending from Alabama and Georgia through the Carolinas to southeastern Virginia. Elsewhere east of a line running from extreme western Texas to the west end of Lake Superior spring temperatures will average 2° or 3° below the seasonal normal. Coldest month in all of this eastern section of the country will be May.

In the entire country west of this Texas Superior line the spring season will average much below the normal temperature, from 3° to 5° or 6° below normal. In this western part of the country March and May are expected both to be very cold months, with May slightly the colder, relative to the normal, in southern sections. The month of April is indicated to be somewhat milder than the other two months.

Rational Use of Steam for Heating Is Subject of Paris Conference

Highlights of a conference which was recently held in Paris, and which was devoted to unusual sources of heating steam and to all aspects of the distribution of steam and its employment as a heat-transfer agent, are reported this month by our correspondent in London.

HOW many beans make five? How many ways can you get steam for the purposes of heating without installing a boiler and using fuel for this specific job? Are boilers and fuel so cheap that nobody would ask such a question? Even if there were spare heat one side of the factory and heating steam were required on the other?

December in Paris was warmed by a conference on the Rational Use of Steam for Heating, organized by the Institut Francais des Combustibles et de l'Energie; and organized with that efficiency and logic for which the French are famous. Witness the beautiful logic (and unpracticality) of the metric system of units. Altogether 35 papers were presented, which called for a strict timetable in the discussion. It is a European custom, on which some visitors from the U.S.A. have remarked, really to discuss papers presented at such meetings. The difficulty is, of course, to prevent verbal contributions to the discussion from becoming mere advertisements for the contributors' own products. And so a tradition has grown up that anything like this is "not done." If a speaker wishes to agree with the author that it is unfortunately true that many installations of a certain type of plant suffer from such and such defect, but to claim that the plant made by his firm is quite immune, then he has to do it with such care and in such a roundabout way as to leave half the audience in complete ignorance of the name of the firm he works for. This concentrates the discussion on scientific and technical aspects.

Sources of Steam for Heating

This conference was dividend into 8 sections. and in the first there were 8 papers dealing with sources of heating steam. R. Dupuy, vice president fo the French Association of Heating and Ventilating Engineers, dealt with the general question of obtaining steam from back-pressure or pass-out turbines or engines. Factories which have to be self-sufficient as to their heating and power needs, factories which are on an estate and can share these services and factories in a position to purchase additional requirements from the public supply, all receive mention in his paper, and he considers there are practical solutions to all difficulties. He concludes by saying that this system has such merit from the point of view of overall economy that it should be developed to a much greater extent. Two papers on developments in back-pressure and pass-out turbines and one on reciprocators followed this opening. In the latter Dr. Otto Klusener does not shirk the problem of oil in the exhaust steam. He refers to the development in Germany of a "dry-running" machine which depends on graphite lubrication and also to a new and rather complicated design with a double-walled piston in which the steam is apparently kept separate from the lubrication. The adavntages of piston engines over turbines for low speeds and in small sizes are great enough to act as a stimulus for making them more efficient and more economical.

The gas turbine produces an exhaust which is at quite a useful temperature for heating purposes, and a popular and practical method is to use the exhaust gases for heating water or generating steam in a waste-heat boiler. Chambadal of France writes on this topic and points out that if the heat in the gases is insufficient they nevertheless contain enough oxygen to support the combustion of further fuel if a boost is required on the heating side. There are a number of installations already operating, in the U.S.A. and in Europe, on this principle, and Zenete of Italy in his paper explores the mathematics of the combination.

Steam Transformers

The two remaining papers in this section are by Delcroix on steam transformers and by F. Schlumberger on thermo- and turbo-compressors. The steam transformer has had a restricted use, and many heating engineers have never heard of it at all. Its function is to accept pure steam at the exhaust or pass-out pressure from a turbine and return pure condensate to the high-pressure boilers: on the secondary side of the transformer steam is generated at a somewhat lower pressure from water which has received only a moderate degree of purification or chemical treatment. An example of such an installation is in the district heating system of the city of Hamburg: pass-out steam from the power station turbines is used in a transformer to generate steam for district heating. Delcroix believes there is still a place for the steam transformer, but he admits that new developments in the complete de-ionization of boiler feedwater by exchange resins are altering the picture; there is a loss of pressure, and therefore of power, when using a steam transformer, and in most cases it is more economic to run the boilers with a high rate of fresh make-up.

Expansion Joints and Insulation

Having obtained the steam, the next logical problem is its distribution to the points of use. The paper by G. Costes is a general review covering this field. Beyond a table showing the minimum spacing between supports the paper contains no data, but it is a concise summary and

among the more obvious points the author draws attention, for example, to the importance of putting valves where men can operate them without having first to find a ladder. The means available for compensating expansion in steam lines are dealt with by M. Destribats, whose paper is of an altogether different character. It begins with an exposition, with the necessary mathematics and graphs, of the effects of temperature change, the permissible constraints, the influence of elbows and bends, and the job which the compensating device has to do. Four types of compensating device are then considered. There is the lyre which, unless its installation involves large civil works, is cheap and satisfactory from all aspects except that of causing a substantial pressure loss, particularly if the steam velocity is high. There is the bellows or corrugated type of axial compensator, which is considered to be costly and to put a considerable strain on the fixed anchorages, but has the advantage of low pressure-loss. Thirdly there is the lateral displacement type in which a pair of bellows or corrugated units are used to accommodate a change in direction of the central portion of a Z. Fourthly is the sliding expansion joint with a sleeve which he states is much used in district heating schemes in the U.S.A.

The President of the French Association of Heating and Ventilating Engineers, A. Guichemerre, contributed to this section of the conference a solid but concise treatise on thermal insulation. He pays particular attention to the economic aspect. After all, technology has advanced so far in this field that it is easy to insulate a pipe for any permissible Btu loss; the big question is how far it will pay to do so. The paper contains five pages of reference data in the form of tables and graphs.

Accumulators, Traps and Re-Cycling

That was enough food for thought for the first day, and the conference delegates were refreshed in the evening with cocktails and *buffet froid* at the headquarters of the Institute (3, rue Henri-Heine, Paris XVI) to which address inquiries should be made for copies of the papers. Steam utilisation was the guiding idea for the second day's discussions. A. Liebaut and O. Durouchoux kicked off with calculations and an assessment of the usefulness of steam accumulators. Since there are at least a thousand of these animals in service in the world and they are still being installed they are almost certainly economic in the right circumstances. The author concluded his survey with a quotation from Oliver Lyle's book "The Efficient Use of Steam", a quotation which sounds grand in French, "*En cas de doute, installez un accumulateur.*"

Heat Exchangers

In a section entitled "Exchangers" there are four papers: two are excellent expositions of modern ideas of arranging heating surfaces so as to obtain the best possible heat transfer with the minimum pressure drop; they are well illustrated with diagrams and non-mathematical. One is a thesis on the possible gain in heat transfer to be obtained by re-cycling steam; this can be achieved by means of a thermo-compressor, and the main advantage lies in the reduced thickness and resistance of films of air on the condensing surface, because of the higher steam velocity. The fourth is by Professor J. Boehm of the University of Alexandria and is entitled modestly "Data on the coefficients of the transmission of heat relative to steam." There are 17 graphs or nomograms and as many equations, some of them fearsome at first glance, although the Professor says he has compiled half a century of research for the use of the practical engineer and hopes that pure theorists will pardon his simplifications. The paper is certainly worthy of serious study.

The nearest thing to sales propaganda in the conference occurs in a paper on steam traps. After a straightforward review of the different types of traps and some words of wisdom on the importance of removing air as well as water from steam, R. J. Schmitt allows himself the comment that if a trap is not functioning correctly this is rarely the fault of the trap; it is more likely to be due to choice of an unsuitable type, the wrong size, or bad installation.

Operating Problems

The Friday afternoon was occupied in discussing papers dealing with operating troubles, such as anomalies in the functioning of expansion valves, corrosion, water treatment and scale formation. C. Levy made out a case for metering the steam to the different departments of a factory. Although this could be an expensive matter, the economies that result indirectly may reduce the amount of new boiler plant that is needed as a factory expands its output.

Synthesis

Saturday was devoted to descriptive papers intended to illustrate from actual installations the putting together of all the principles discussed on the previous days. These included paper works, a chemical works, a sugar refinery, textiles, a hospital, and a gas turbine installation. But one of the most interesting was that by Professor Gilbert Burney, director of the Thermodynamic Laboratory at the University of Liege, Belgium. The Professor is also responsible for the central power station which supplies a large group of university buildings with both power and space heating.

There are two boilers, coal-fired with chain grates, producing 16,000 to 20,000 lb of steam per hour at a pressure of 525 psi and superheated to 800 deg F. The steam is used in a turbine to generate power and as much as is required for heating is drawn off at a pressure between 22 and 37 psia, the balance being passed to a condensing turbine. The steam for heating is used to heat water for supply to the buildings, and the scheme has been sufficiently successful to warrant a recent increase of 25% on the heating side.

A university plant suffers disadvantages from the point of view of economic assessment because students act as unpaid staff, instrument repairs are unlikely to be charged, experiments reduce the possible efficiency. Professor Burney, however, has included in his paper a review of the whole Belgian power industry and considers his plant against this background.

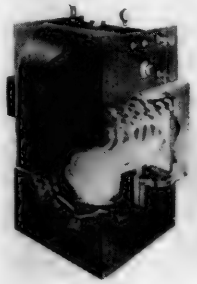
He concludes that it has fully justified itself economically and that many more plants of this combined type should be built.

NEWS OF EQUIPMENT AND MATERIALS

Use the convenient prepaid postcard appearing on page 125 for securing additional information on new equipment and materials described in this department.

Heater Line Is Extended

The capacities of its WH Series line of tankless, twin coil, water heaters have been extended by Portmar Boiler Co., Inc., Brooklyn, N. Y. The line can now automatically supply large quantities of sanitary hot water, without a storage tank, for residences, apartment houses, motels, restaurants, automatic laundries, hotels, hospitals, office building, luncheonettes, schools, gymnasiums, factories, and processing plants.



Supplied with an oil or gas burner and built to ASME Boiler Code specifications, the self-contained water heaters are available in fourteen sizes, delivering hot water from 300 to 6000 gph at a 100-deg F rise.

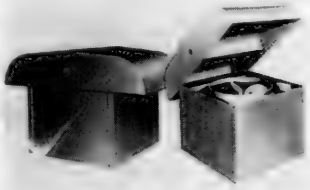
The twin coils are connected adjacent to each other and submerged horizontally across the top section of the heater, where the hottest water is contained. One coil performs as a preheater, permitting hot water circulation through the coils.

When two temperatures of evenly tempered instantaneous hot water are required, 140-deg for general use and 180-deg sterilizer-rinse for dishes and pots, both can be supplied from the same water heater.

More information? Circle Item 1 on postcard, page 125.

Propeller-Type Exhauster

A propeller-type roof ventilator is introduced by The Peerless Electric Co., Warren, Ohio. It is being manufactured with fans from 12 to 48 in. and capacities from 640 to 22,000 cfm. The unit is weatherproof and low in silhouette. It is recommended for exhaust duty on commercial and industrial buildings.



The roof ventilator discharges air in the downward direction so that prevailing winds will not affect the discharge. Shutters are mounted at the bottom of the unit so that rain, wind or snow will not affect operation, or rattle them. Automatic or motor driven shutters are furnished as specified.

All units are equipped with disconnect switches to prevent power from being accidentally turned on while the unit is being serviced. Removal of two cap screws permits the lid to be opened for servicing.

Sizes and performance ratings are compiled in Bulletin SDA-143-7.

More information? Circle Item 2 on postcard, page 125.

Two-Tone Air Conditioners

Packaged air conditioning units for commercial and residential use are made in pastel color combinations by Refrigeration Div., Curtis Mfg. Co., St. Louis, Mo.

In designing the units, the company is following the trend to colors in many manufactured products for offices as well as homes. Customers may now select color combinations in packaged air conditioning units.

The units come in combinations of dusty pink, French gray, Firnmist, colony blue, sandalwood, and pottery blue. The user may combine any two of the colors to blend with the particular decorative pattern desired. The packaged units are made in capacities from 3 to 20 tons.

More information? Circle Item 3 on postcard, page 125.

Venting Valve

A venting and cycling valve for use in vented tees installed on baseboard heating systems is being manufactured by Flair Mfg. Corp., Brooklyn. N. Y.

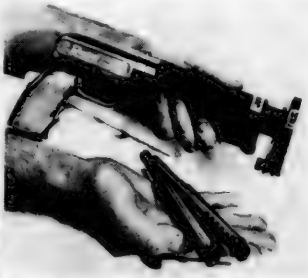
Designated No. 22, the valve is designed to fit the baseboards currently offered on the market. The valve has a collection chamber to permit the accumulation and venting of air thereby preventing surges of the system circulator from continually wetting the hygroscopic washers.

Shipped individually boxed, the valve is fully automatic and does not require initial adjustments at the time it is installed.

More information? Circle Item 4 on postcard, page 125.

Fastener Has Two Barrels

A powder-actuated construction and maintenance fastening tool, the Duo-Jobmaster, with interchangeable barrels is made by Ramset Fastening System, Winchester-Western Div., Olin Mathieson Chemical Corp., Cleveland, Ohio.

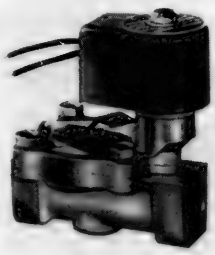


Because it can be used for either a ⅜-in. stud or ¼-in. stud with only a change of the barrel, the fastener makes it possible for the single tool to be utilized for 90% of the usual fastening jobs in construction. The change of the barrel can be made on the job, and a man working on a scaffold would not have to get off it to make the conversion.

More information? Circle Item 5 on postcard, page 125.

Pilot Operated Valve

A ¾-in., general purpose, 2-way, solenoid valve with a full area port is introduced by Automatic Switch Co., Orange, N. J.



Designated Bulletin 8210A, the internal pilot operated valve has a forged brass body and bonnet and a synthetic rubber diaphragm. Available normally closed (opening when the solenoid is energized) or normally open (opening when the solenoid is de-energized), the valve can be mounted in any position.

Three operating parts are utilized by the valve: a stainless steel core, a spring, and the Hycar diaphragm. Packless construction is used; no stuffing boxes or sliding glands are needed. The valve handles oil, water, and gas up to 125 psi. The continuous duty, Class A coils require 10.5 watts a-c or 10 watts d-c to operate.

The unit is available with either a pressed steel, watertight, or explosion-proof solenoid enclosure. The explosion-proof enclosures are UL-approved and listed for Class I, Group D, and Class II, Groups E, F and G, hazardous locations. Luxolene molded coils, for extreme humid or moisture conditions, and dual voltage coils can be provided.

More information? Circle Item 6 on postcard, page 125.

Submersible Pump

A submersible pump, which is new in design, and incorporates new materials, is introduced by The Dayton Pump & Mfg. Co., Dayton, Ohio. It will be known as the Rapidayton Dolphin and is built for 4-in. wells ranging to a depth of 500 ft.

Instead of the usual brass, stainless steel and Nylon are the materials used for the pump to provide maximum efficiency and abrasion resistance. The impeller, which is hydraulically balanced, is made of Nylon. Its design eliminates motor thrust and therefore the need for thrust bearings. The case is made of stainless steel for handling pure fresh water.

Among the features of the pump are an electronically-tested seal and a fluid-filled motor which gives a higher performance within optimum range of horsepower used. The stainless steel shaft is double-keyed to prevent play between the impeller and the shaft. The pump has a perforated brass strainer.

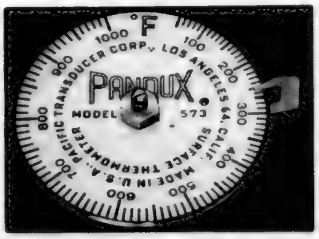
Only a reasonably straight well casing is necessary to install the pump. There is no need for a frost-free pump house or pit.

Capacities up to 1000 gph and pressures up to 80 lb can be obtained. The pump is available in ½, ¾, 1, 1½, and 2-hp models. The number of stages varies from 7 to 21.

More information? Circle Item 7 on postcard, page 125.

Surface Thermometer

A spot check, surface thermometer, Model 573, is announced by Pacific Transducer Corp., Los Angeles, Calif. The thermometer is made entirely of stainless steel, with a range from 50 to 1000 deg F.



To use it, one merely lays the instrument on the surface to be checked. Within 60 seconds, the thermometer will reach stability, and the temperature can be read. It reads temperatures of surfaces such as dies, hot plates, heavy sheet metal, furnace skins, boilers, large superheated steam pipes and cooled billets. Besides surface temperatures, it also reads ambient temperatures in furnaces, ovens and other enclosed spaces, as well as in non-corrosive liquids and gases, up to 1000 deg.

The thermometer is calibrated to within plus or minus 2%, and can be re-set by the user, if necessary, at any time. The diameter is 1¾ in. overall, and the weight is ⅓ oz.

More information? Circle Item 8 on postcard, page 125.

All-Purpose Hose

An all-purpose hose is announced by Manhattan Rubber Div., Raybestos-Manhattan, Inc., Passaic, N. J. Described as suitable for use with air, oil, water and mild chemicals, the hose is being marketed under the trade name Allflex.

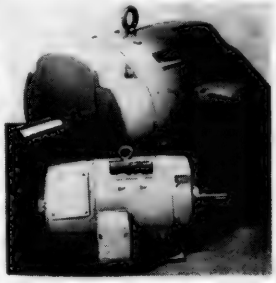
The hose is the newest addition to the company's R/M line of hose. It is mandrel-made, horizontally braided.

More information? Circle Item 9 on postcard, page 125.

D-C Motor and Generator Line

A new line of direct-current motors and generators is announced by General Electric Co., Erie, Pa.

Called Kinamatic, the line has been designed for versatility of application and performance. Speed is adjustable by armature voltage control, field strength control, or any combination of both. Higher base speeds are available, and higher top speeds may be obtained by field strength adjustment. The motors can operate at any speed below base, including stalled torque.



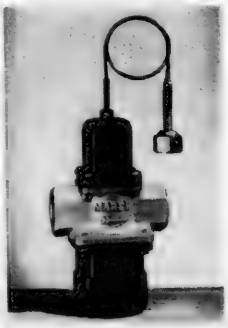
All standard motors and generators have dripproof enclosures and are supplied with a guaranteed 15% service factor. Class B insulation is supplied throughout. Reduced armature inertia permits faster speed of response. Many features have been incorporated into the line to facilitate maintenance.

All ratings and accessories are available from 1 to 150 hp and ¾ to 100 kilowatts.

More information? Circle Item 10 on postcard, page 125.

Water Regulating Valve

A pressure-actuated, condensing water, regulating valve is added to the line of regulating valves manufactured by Jas. P. Marsh Corp., Skokie, Ill.



Designated No. 56, the valve has a continuous adjustment range from 60 to 260 psi. This range permits the use of one valve on either Freon 12 or Freon 22 systems as well as on other common refrigerants, except ammonia.

All adjustments on the valve can be made by hand. A knurled cup at the bottom of the valve permits on-the-job adjustments without using a wrench or screwdriver.

The valve is small and compact, direct-acting, and of diaphragm construction. It may be mounted in any position without the use of mounting brackets and may be manually flushed and serviced without breaking connections.

More information? Circle Item 11 on postcard, page 125.

Purge Type Thermocouple

A purge-type thermocouple for high temperature and pressure services is offered by Trinity Equipment Corp., Roselle Park, N. J.

Developed for temperature conditions up to 2900 deg F at high pressures in reactors, catalyst beds, and glass plants, the unit consists of a ceramic tube which houses the platinum purge tube and platinum-platinum rhodium couple.

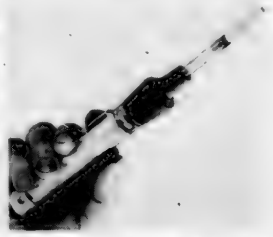
Information on the assembly is contained in Data Sheet No. 8552.

More information? Circle Item 12 on postcard, page 125.

Pocket CO Detector

A pencil-size, carbon monoxide detector is made by Bacharach Industrial Instrument Co., Pittsburgh, Pa., as a safety check on carbon monoxide hazards in garages, mines, vehicular tunnels and furnace rooms, and in commercial or residential buildings where gas appliances are installed.

Trade-named Monoxor, the instrument shows the presence of carbon monoxide concentrations as low as 40 parts CO per million parts of air. It requires no color matching or reference to a comparator scale and consists of a replaceable indicating tube and an aspirator pump with a connector for holding the indicating tube during the test.



The indicating tube is a glass tube containing a yellow chemical which turns brownish-gray when carbon monoxide passes through the tube. The tube ends are sealed as supplied, and the seals are broken off when the tube is inserted into the pump connector.

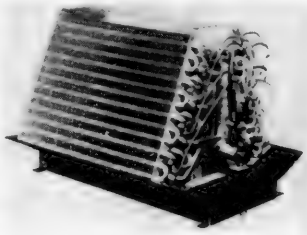
Air is drawn through the tube by depressing the button in the center of the pump barrel. After the button has returned to its original position (about 6 seconds) the indicating tube is examined. If the chemial shows a brownish-gray stain the CO concentration in the atmosphere tested exceeds the limit allowable for short time exposure and the area should be cleared immediately. If the chemical shows no stain a second pump stroke is taken. The appearance of a brownish-gray stain after the second stroke indicates that the air contains CO in a concentration which begins to constitute a danger to health and such a room should be occupied for only short durations.

No appearance of stain after the second pump stroke is an indication that there is no hazardous concentration of carbon monoxide in the air.

More information? Circle Item 13 on postcard, page 125.

Furnace Bonnet Cooling Coil

A furnace bonnet air conditioning coil that converts forced air furnace duct systems to summer cooling service is produced by Refrigeration Appliances, Inc., Chicago, Ill.



Called Krack, the coil consists of a V-bank arrangement which may be included in new systems or applied to existing installations.

Three models are available offering 24,000, 36,000 and 60,000 Btu per hr nominal capacities, respectively. The tubing is made of copper, electroplated with tin, and the fins are multi-tube type made of heavy gage aluminum.

An illustrated bulletin giving complete data on the furnace bonnet coil is issued by the manufacturer.

More information? Circle Item 14 on postcard, page 125.

Small Return Bend

A new type of return bend has been developed by Gerry Tool Co., Bristol, Conn. It is a female return bend designed to accomodate ¼- to 1-in. diameter tubes in steps of ⅛ in. with an optional cup depth of 3/16 to ¼ in. The center-to-center distance would be ⅛ in. greater than the outside tube diameter the return bend accommodates.

The return bend is made for domestic hot water heating equipment, air conditioning units, refrigeration units, and heat exchangers. It permits more tubes to be accommodated in a small opening and can be used to convert old domestic hot water heating systems into more modern, efficient units.

More information? Circle Item 15 on postcard, page 125.

Plastic Drain Pipe

Lightweight plastic pipe, designed for sewer and drain applications, is being produced by Carlon Products Corp., Cleveland, Ohio.

Designated Carlon D, the pipe is suitable for sewer-to-house and house-to-septic tank connections because of its resistance to moisture and corrosion. Its weight—10 ft of 4-in. pipe weighs 14½ lb—enables one man to install 100 ft of pipe in 40 minutes with nothing more than a saw and a can of quick-setting cement.

An important characteristic of the pipe is that it can be compressed to 75% of its normal diameter and still return to its original form. This permits the pipe to be laid beneath heavy truck and machinery traffic.

To join two lengths of the pipe together, it is necessary to brush the company's cement on the outside ends of the pipe and the inside the coupling, then push them together. A dividing ridge in the center of the coupling helps to position the pipe at its proper place for permanent sealing.

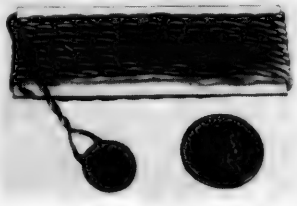
The plastic pipe comes in 10-ft lengths in 2- to 6-in. sizes with a complete line of reducers, adaptors, and couplings for special sizes and angles and for coupling other types of pipe.

More information? Circle Item 16 on postcard, page 125.

Disc Indicates Heat Flow

A heat flow disc, made of a tellurium alloy and smaller than a penny, has been developed by National Instrument Laboratories, Inc., Riverdale, Md. The disc is sufficiently sensitive that 1 Btu per sq ft per hr generates 2.5 microvolts.

Called the JLC-Hatfield Heatflow disc, the indicator is a wafer-thin, single electrical junction. Its internal electrical impedance is 1 ohm, and its thermal resistance is 0.009 deg F per Btu per hr per sq ft. The disc loses or gains heat almost exactly as the surface to which it is applied, whether the heat transfer is by radiation, conduction, or convection. To increase its output or to average measurements over a wide area, several discs may be connected in series.



Applications range from industrial process control to measuring the flow of heat from humans and animals. Some of its uses involve thermal radiometers, chemical process instrumentation, and the leakage of heat from furnaces, insulated pipes, machinery, or into refrigerated containers. In another application, the disc is imbedded in a solid mass through which the flow of heat is to be measured. If the temperature gradient in the mass is measured at the same time, its thermal conductivity can be quickly calculated. This method, used in testing materials, dispenses with guard ring measurements of watts or calorimetry.

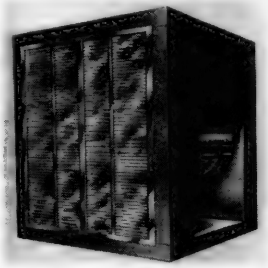
The disc, supplied with leads and attaching lugs, is furnished singly or harnessed in multiple holders. It is available calibrated or, for work not requiring the highest accuracy, uncalibrated.

More information? Circle Item 17 on postcard, page 125.

Evaporative Coolers

An improved line of commercial evaporative coolers is announced for 1956 by Indoor Climate Products, San Antonio, Tex.

Available in capacities ranging from 4,500 to 12,000 cfm, the units are protected from weather by a five-stage, metal treating process. Five models are made ranging in height from 42 to 60 in., in width and depth from 40 to 52 in., and in shipping weight from 230 to 650 lb. Blower sizes range from ½ to 2 hp.



Models 45 LC and 55 LC are available with two-speed, ½-hp motors (115v). Model 55 LC is also available with a ¾-hp, single-speed, capacitor start motor (115-230v) or a ¾-hp, two-speed capacitor start motor (115v) for use with duct system. Motors other than standard equipment carry a slight extra charge.

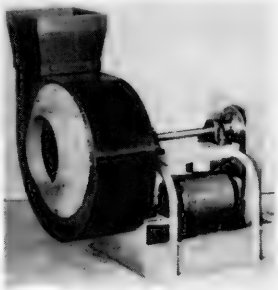
Commercial models are shipped with the electric cord in order to permit wiring-in as required at point of installation.

More information? Circle Item 18 on postcard, page 125.

Induced Draft Fans

Induced draft fans are made by the Whitty Co., Inc., Boston, Mass., for commercial and industrial buildings without tall stacks or high chimneys.

Made of welded steel, the fan housing is supported by a base that is adjustable to floor stands, lag bolts, or ceiling hangers. The motor is a horizontal type, provided in any standard voltage. Fan speed is adjustable through a variable pitch motor pulley. The belt drive has an adjustable take-up.



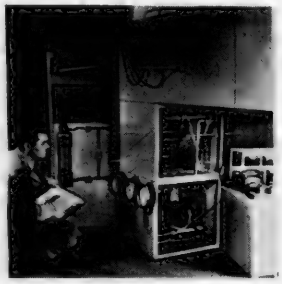
Standard discharge positions of the fan are vertical, horizontal, or 22.5, 45, or 67.5 deg with the horizontal. Either clockwise or counterclockwise rotation is available.

Standard equipment for the fan includes the mounting, motor, and magnetic starter. A low limit draft cutout, programming relays, an adjustable speed transmission, and a barometric damper are available as optional equipment when needed.

More information? Circle Item 19 on postcard, page 125.

Air Conditioning Cubes

A cube design for residential air conditioning equipment whcih permits over one hundred arrangements of water- and air-cooled equipment has been developed by Lipman Div., Yates-American Machine Co., Beloit, Wis. The cube arrangements correspond to up-flow, downflow, horizontal, lowboy, and highboy furnace designs.



Individual cubes may also be used for residential air conditioning in self-contained or remote systems built up in the field. The cubes are all of the same dimensions in the 2 and 3-hp size units, which consist of a blower cube, an evaporator cube, and a compressor cube. The remote air-cooled section is a condensing unit that is designed for operating in extreme ambient air temperatures.

Controls and accessories for the cube units will be available to fit requirements.

The cube design was developed to meet the requirements of furnace manufacturers, with a view to permitting individual custom air conditioning equipment. Size range will be in the 2, 3, and 5-hp classification.

More information? Circle Item 20 on postcard, page 125.

Incinerator Heats Shop

An incinerator-stove which provides heat for shops is a new product of Hoskinson Industries, New Hyde Park, N. Y. The heater burns all kinds of rubbish, thereby eliminating the cost of having to cart it away. The rubbish fire supplies heat to both shops and offices. It saves on rubbish removal bills, heating bills and rubbish clutter in the shop.

Constructed of cast iron and heavy steel plate, the heater has a feed door which measures 30 x 14½ in. and which can admit large cartons and heavy materials. The fire box and ash pit can burn debris up to a week without removing ashes. The unit does not require a permanent chimney. The stove area contains two flue stack unit heaters and works with automatic controls. A draft inducer provides a draft over the fire at all times. The unit will supply heat from rubbish for up to 2000 sq ft of floor space during winter months.

More information? Circle Item 21 on postcard, page 125.

Air Deodorizer

An air conditioning deodorant and air freshener has been developed and is being marketed by Easton R. S. Corp., Brooklyn, N. Y.

Trade-marked Eastonair, the deodorant slowly evaporates when placed in a moving air stream and liberates controlled amounts of neutralizers to eliminate the disagreeable odors found in air conditioning systems. The product also freshens stale air without imparting a new odor to the system.

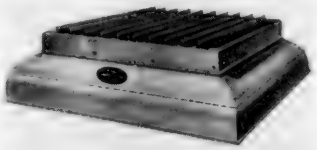
The deodorant does not contain vegetable dyes, such as chlorophyll, nor chemical agents that deaden the sense of smell. It does contain a synthesized chemical agent that is non-toxic and non-irritating. Due to its properties, the deodorant does not require reactivation.

The product is packaged in 1-lb jars for industrial and commercial applications. There is no danger of spilling or corrosion, and the installation of the product does not require special apparatus or special duct openings.

More information? Circle Item 22 on postcard, page 125.

Aluminum Roof Exhauster

A roof exhauster made from extruded aluminum sections is introduced by Iron Lung Ventilator Co., Cleveland, Ohio. All the exhauster's joints are welded. There are no riveted or bolted joints.



Named Alumalung, the exhauster is sufficiently light in weight to be hoisted and installed by two men without special equipment. It does not require painting and has an overall height of 21 in., which enables it to be hidden by parapet walls.

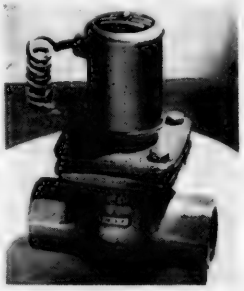
The exhauster is available with capacities from 3800 to 42,000 cfm in the following sizes: 20, 24, 30, 36, 42, 48, and 60-in.

More information? Circle Item 23 on postcard, page 125.

Additional Solenoid Valves

Several new models are added to the line of stainless steel solenoid valves manufactured by J. D. Gould Co., Indianapolis, Ind.

Included in the new models are normally closed and normally open types in three sizes: 1¼, 1½, and 2-in. They are designed to eliminate hammer and shock in the automatic or remote control of chemicals, steam, air, gas, and other liquids.



Features of the valves include stainless steel parts renewable Teflon discs, full ports, unbreakable, stainless steel piston rings, and packless operation on a range of operating pressures.

The coils are unconditionally guaranteed. Greenclad, waterproof molded coils are made for temperatures to 250 deg F and silicone insulated coils for higher temperatures. The coils are interchangeable between sizes and with the company's other valves.

Explosion proof coil housings, special assemblies and special alloys are available to meet particular requirements. Bulletin K gives complete specifications and details of the valves.

More information? Circle Item 24 on postcard, page 125.

Clay Sewer Pipe

A plastic-jointed, vitrified clay, sewer pipe, named Plastic Jiffy Joint, is produced by Cannelton Sewer Pipe Co., Cannelton, Ind.

The pipe joint is made of bright red polyester plastic, die-cast permanently on the spigot end of the pipe at the factory. The bell end has a bituminous socket that provides the flexibility needed for tight joints.

The plastic collar on the spigot end is made of heat-setting polyester. High temperatures make it hard. As a result of this the joint can be stored indefinitely under the sun with no danger of softening or deformation of the spigot joint. In addition, the plastic collar doubles the impact strength of the spigot end, so that careless handling by inexperienced personnel does not result in a high breakage loss.

To install the pipe, the bituminous socket on the bell end is painted with solvent and the plastic spigot pushed home with a slight spiral motion. It is not necessary to paint or swab the plastic collar.

Four-foot lengths of the pipe are available in 4-in. diameters and 3-ft lengths in 6-in. diameters. Literature and information is available.

More information? Circle Item 25 on postcard, page 125.

Automatic Absorption Coolers

A line of automatic, absorption, refrigerating machines, operated by heat energy and used to supply chilled water for cooling in large air conditioning systems, is announced by Carrier Corp., Syracuse, N. Y. The machines have no major moving parts, use plain water as a refrigerant, and are designed to reduce installed cost and provide pushbutton operation and electronic control.

Models are available in a range of sizes providing from 100 to 700 tons of cooling capacity. Most connections are made at the factory within the unit, and smaller sizes are shipped in one piece.

The machine adjusts automatically from full capacity output down to zero load. It can be started or stopped by pushbutton, time clock or thermostat. In the event that cooling beyond design capacity is required, it will continue to operate, delivering additional tons of refrigeration, at a higher temperature level.

The machine is usually powered by the heat energy from steam. It can use low pressure steam obtained from back-pressure turbines or from processing operations. Although steam is most generally employed, any hot fluid, such as hot water, oil or chemicals, may be used to generate the cooling.

In addition to the top floors of buildings, the absorption machine can be placed high on the steelwork of an industrial plant close to the process where cooling is required. It is also suited to outdoor installations.

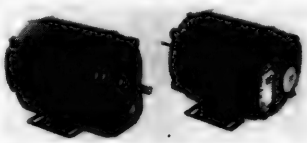
Catalog 16C-8 gives the specifications and engineering data of the machines.

More information? Circle Item 26 on postcard, page 125.

Motors Have Smaller Frames

A 1/20 to ⅓-hp, 48-frame motor line is introduced by Century Electric Co., St. Louis, Mo.

Among the features of the smaller, lighter motor are its high pressure, cast aluminum, end brackets, which are machined and stress-relieved for permanent dimensional accuracy. For cooling, the motor has an integrally-cast, cluster-type aluminum fan. The square stator iron allows space for cooling air to pass between the frame and the core and to cool the whole core width. The standard frame is completely drip proof. Totally enclosed, unit heater, permanent split capacitor types and others are available with rigid or cushion bases.



More information? Circle Item 27 on postcard, page 125.

Crane's Boom Telescopes

A boom that will telescope hydraulically with a full-capacity load is one of the improvements in the Model 60, Hydra-Lift truck crane introduced by Pitman Mfg. Co., Kansas City, Mo. The Model 60 is the result of a redesigning of the Model B, a 6400-lb capacity truck crane requiring 40 in. of space behind a truck cab. The new model installs on any truck 2 tons or larger.

With the telescopic boom, an operator can position the boom with its load outside a window, extend the boom hydraulically through the window, set the load down, then retract the boom and swing it clear. Now offered as optional equipment, the boom increases the crane's usefulness to the extent that it may soon become standard equipment.

The hydraulic boom telescopes from 17 to 27 ft. The standard tubular boom telescopes manually from 12 to 17 to 22 ft.

To set the hydraulically-operated outriggers, inside the truck or out, the operator pushes two levers which he can reach without moving from his regular operating station. Full-capacity loads can be raised or lowered with the boom. For heavy loads it formerly was necessary to first position the boom, then raise the loads with the loadline. Now the heaviest loads can be raised either with the loadline or the boom.

The crane is suitable for handling such materials as: pipe, valves, hydrants, fittings, manhole covers, utility poles, culverts, timbers, stone, heavy equipment parts, and accessories.

More information? Circle Item 28 on postcard, page 125.

Tripod Is Adjustable

A tripod with adjustable working heights is manufactured by B. E. Wallace Products Co., Exton, Pa.

Called Magic-Pole, the tripod has telescopic legs that are adjustable by 6 in. steps to permit setups on ramps, platforms, or rough ground without digging in the uphill leg. The model shown in the illustration extends to a working height of 10 ft 3 in. and closes to a length of 6½ ft for handling and storage.

Through the use of steel and aluminum alloys, the weight of the tripod has been kept down to 66 lb by the manufacturer. Being rust resistant, the tripod can be used indoors or out.

A screw-in spike on the base of the tripod permits firm setups on concrete, wood block, asphalt, soil, or gravel. A special non-skid pad is also available where polished floors must be protected.

The model shown has a lifting capacity of 3 tons; other models are available with lifting capacities of 1, 1½, and 3¾ tons.

More information? Circle Item 29 on postcard, page 125.

Bowl for Nurseries

The expansion of its institutional line of fixtures with a new nursery bowl is announced by Universal-Rundle Corp., New Castle, Pa.

The nursery bowl is a rim, siphon-jet, vitreous china, flushometer bowl designed specifically for kindergarten and nursery school installations. Designed with a 10-in. high rim, it has a bowl height suitable for children of nursery and kindergarten age. Available models include a 1½-in. top spud for use with a flushometer, or a 2-in. top spud for use with wall hung tanks. Both bowls are 6 in. from the center of the inlet to the center of the outlet.

The company's process gives the nursery bowl the same surface as its other fixtures. The nursery bowl is available in a choice of jonquil yellow, azure blue, rose pink, verdant green, mist gray, desert tan, or arctic white.

More information? Circle Item 30 on postcard, page 125.

Reverse Cycle Unit

A reverse cycle unit (the Customatic) is included in the 1956 line of room air conditioners made by Fedders-Quigan Corp., Maspeth, N. Y.

An automatic defrost cycle, built into the unit, prevents icing up, in freezing weather. The power heat pump automatically defrosts itself and can draw heat out of outside air in 10-deg temperatures.

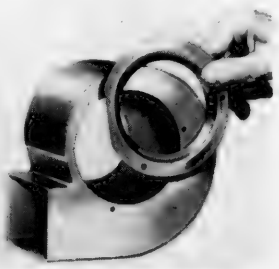
The desired room temperature is set on a manually adjustable thermostat on the unit's control panel. The reverse cycle heat pump then draws the required amount of heat out of the outside air and pumps it into the room. If sufficient heat cannot be obtained from the outside, the first leg of a 3000-watt, two-station heating coil goes into operation. This 1000-watt first stage, combined with the heat produced by the reverse cycle heat pump, provides the required heat.

If outside temperatures are such that the heat production of the reverse pump and the first leg of the coil is still insufficient, the heat pump cuts out automatically and a second, 2000-watt leg of the heating coil is put into use. The heat from the coil is circulated into the room by a fan.

More information? Circle Item 31 on postcard, page 125.

Housing for Small Blower

A small blower housing, designed for a 3¾-in. wheel, is added to the De-Sta-Co line of standard housings by Detroit Stamping Co., Detroit. Mich.



With the development and installation of special equipment, the new model (No. 350) blower housing is available both to high- and low-volume manufacturers who might have use for such a small housing in their components or finished products. It is supplied from stock in all practical widths. Standard assemblies are provided with open side-plates for mounting dual inlet flanges, or single flange and cover plate, for adaption to clockwise or counter-clockwise wheel rotation.

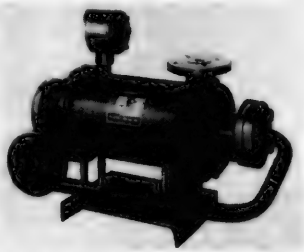
In quantity orders, the housings are available with integral inlet flange or blank cover plate on either side so that special requirements may be met.

Information on prices and specifications are offered by the manufacturer.

More information? Circle Item 32 on postcard, page 125.

Two-Stage Motor Pump

A 3-hp, double-ended pump (Series DE) is added to the line of canned motor pumps made by Chempump Corp., Philadelphia, Pa., for handling corrosive, toxic, explosive, radioactive and other hard-to-handle liquids.



Basically a two-stage pump, the unit has chambers that can be piped in series (shown) or parallel for high head or high volume pumping. Overall size of the pump is less than 2 by 1 and 1½ ft, yet it gives heads to 230 ft.

The pump is available in cast iron, cast steel, 300-series stainless steel, Monel and Carpenter-20. Its standard temperature and pressure limits are 450 deg F and 300 psi, respectively.

More information? Circle Item 33 on postcard, page 125.

Impulse Steam Trap

An impulse steam trap with sufficient capacity to handle heavy condensate loads is added to the Yarway line by Yarnall-Waring Co., Philadelphia, Pa.

Designated No. 40 Series, the new traps have capacities approximately two to three times that of the company's same size standard No. 60 Series impulse steam traps.

Features of the trap include high capacity at all pressures up to 600 lb; stainless steel body and internal parts; low pressure operation (no orifice change or adjustment is required from 0 to 600 lb); steam temperature condensate discharge characteristics; freeze-proof operation against back pressure up to 50%; and suitable for applications where dirt and scale are a problem.

Typical applications of the impulse trap are on unit heaters, heating coils, storage water heaters, kettles, large fuel oil preheaters, dryers, evaporators, large platens, autoclaves, and heat exchangers. It is available in ½ and ¾-in. sizes. Larger sizes will soon be available.

Bulletin No. 1746 gives additional information.

More information? Circle Item 34 on postcard, page 125.

1956 Trucks Are Announced

A six-speed automatic transmission leads the list of developments featured by the 1956 trucks introduced by Chevrolet Motor Div., General Motors Corp., Detroit, Mich.

Consisting of 65 models available on 15 different wheelbases, the line features: Automatic transmissions for all models except school buses. The new Powermatic 6-speed unit is offered on fifteen models in the 2-ton group. An optional, heavy-duty 5-speed, manual shift transmission is available on a total of seventeen 2-ton models. The total of nine engines includes four V8s and five sixes.

Safety advances, include new sealed beam headlights, an optional governor for the high powered truck V8, and an hydraulic retarder which is part of the Powermatic mechanism augmenting the regular braking system. Tubeless tires as standard equipment on all models. High capacity, coil spring clutches with multi-spring design, standard with all truck V8 engines.

The 6-speed transmission automatically determines a shift schedule according to load, speed, grade, and other factors. It may be shifted by the driver into three specialized ranges. These are drive; intermediate, for mountainous country; and low, for controlled power.

Including the Powermatic, which is optional for fifteen of the 2-ton trucks, eight different transmissions are offered with the 1956 truck line. These include the Powerglide for the sedan delivery; standard 3-speed; 3-speed with overdrive; heavy-duty 3-speed; conventional 4-speed; 4-speed Hydra-matic for all conventional 1½-ton models; and a new optional 5-speed for all seventeen 2-ton trucks which comprise the 5000 and 6000 Series.

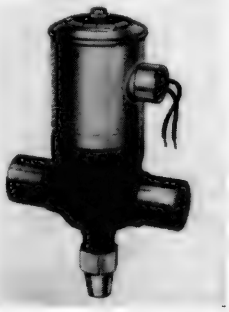
A total of nine engines offered includes a six-cylinder for the sedan delivery, four other six-cylinders of varying components, and four V8's.

Among improvements on both the six's and eight's are oil bath air cleaners as regular equipment for the first time on ½- through 1½-ton models; a new electrical water temperature gage, replacing the capillary tube type; a new fixed screen oil pump intake; and an optional, oil filter for the V8's.

More information? Circle Item 35 on postcard, page 125.

Solenoid Valves Are Changed

Its line of solenoid valves is being modified by Sporlan Valve Co., St. Louis, Mo., in order to provide greater flexibility and increased capacity in their application and operation.



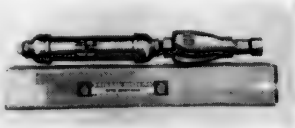
Some models have been modified to provide for increased capacity and universal application for either F-12 or F-22. All of the pilot piston operated types have synthetic seating, instead of metal, in order to assure a tighter closing.

In the interest of standardization, one mounting bracket may be used for the Types 12, 43, 53 (illustrated), 62, 73, and 172 (solenoid pilot control). In addition, one coil—of the Type 90—may now be interchanged between the Types 33, 43, 53, and 83. New style, two-piece nameplates, permit interchanging coils with different voltages without ordering new nameplates or altering the old plates.

More information? Circle Item 36 on postcard, page 125.

Water Conditioner

A water conditioner that eliminates and prevents scale and corrosive formations in boilers and water systems without the use of chemicals is placed on the market by Packard Water Conditioner Div., Inc., Jacksonville, Fla. The conditioner represents an application of nuclear physics principles to the treatment of water.



For use on boilers, air conditioning and refrigerating systems, laundries, and other industrial applications, the water conditioner prevents scale and corrosion by imparting additional energy to the atoms of a water solution. The unit is manufactured in sizes with capacities from 6.5 to 1760 gpm for connection to standard iron pipe sizes ranging from ¾ to 12 in. Larger sizes are also available.

More information? Circle Item 37 on postcard, page 125.

Aerosol Penetrating Oil

Penetrating oil, called Nu-Aero, in an aerosol dispenser is a new product of Pressure Products Co., West Chester, Pa. The penetrating oil is designed for loosening frozen fittings, nuts, bolts, and sheaves.

The pressurized container makes it possible for mechanics to carry the penetrating oil in tool boxes without the danger of spilling it. The aerosol high pressure stream also facilitates the application of the oil in difficult positions such as overhead, or on distant points, for the stream will shoot 4-ft in any direction. The pressurized penetrant can be applied directly into the part where help is needed.

The addition of molybdenum disulfide to the other active penetrates in the oil produces a product which both loosens and lubricates under extreme conditions. The oil will not squeeze out of threads or evaporate from hot surfaces because the molybdenum disulfide lubricates the surfaces it touches with a film that heat or pressure will not destroy.

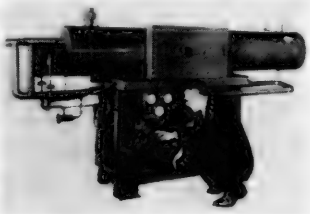
The penetrating oil will cut rust, paint, grease, dirt, corrosion, and is especially suited to hot applications such as furnaces, stoves, steam or hot water fittings, and flange bolts.

More information? Circle Item 38 on postcard, page 125.

Packaged Liquid Chillers

A line of packaged liquid chillers, in a range of capacities from 15 to 300 tons, is announced by Acme Industries, Inc., Jackson, Mich.

Called Flow-Therm, the packaged chiller line consists of two series: the C-Series (illustrated) complete with compressor in capacities from 20 to 175 tons; and the R-Series Flow-Therm for remote compressor mounting in capacities from 15 to 300 tons.



A feature of the C-Series is that they are designed for modern refrigerants. They include compressor, motor, chiller, condenser, heat exchanger, and all necessary controls. The units are completely assembled and factory tested—ready for installation and immediate operation after charging with refrigerant. They are equipped with the company's new Dry-Ex liquid chiller.

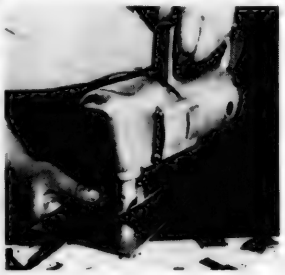
The R-Series is a custom package designed for mounting the compressor anywhere. Its major components, the chiller and condenser, are selected to provide the capacities needed for economy both in initial cost and in operation. Single or dual circuits are available as are two mounting variations designed to fit floor space or head room.

Complete engineering data is contained in Catalog No. 220-B.

More information? Circle Item 39 on postcard, page 125.

Heavy Gage Metal Cutter

A 13-lb portable cutter for heavy gage sheet metals (ferrous and non-ferrous) is introduced by Fenway Machine Co., Philadelphia, Pa. as the latest addition to their line of electric powered, metal cutting tools. Designated Model HN and called Nibbler, the cutter is rated to handle stainless steel of all types up to 10 gage; milder steels and non-ferrous metals to 8 gage.



Some of the features of the tool are that it is portable, maneuverable, and it reduces the materials handling problems common when heavy gage sheet is worked by stationary equipment. The cutter will follow patterns or templates and will cut from any angle. It will also cut contoured or corrugated stock. Its minimum cutting radius is 6 in.

The cutting action is provided by a high speed, tool-steel punch and die which takes a ¼-in. slug of metal with each stroke. Its speed at full load is 600 strokes per minute. The punch and die are removable and may be resharpened or replaced as necessary.

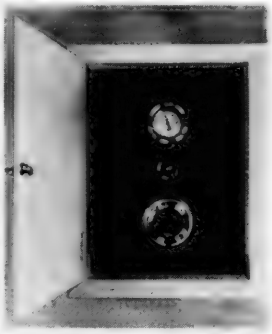
The motor is a universal (a-c/d-c), approximately 1 hp, with a 3-wire, 9-ft rubber cord provided. Also available, as optional equipment, is a ground safe fuse cap for automatic protection against the following conditions: overheating; punch and die are too dull for safe cutting; operator is forcing cut; or the cutter is overloaded with metal of heavier gage or hardness than its rated capacity.

More information? Circle Item 40 on postcard, page 125.

Shower Control Unit

A self-contained water temperature control unit for school showers is added to the line of Leonard Valve Co., Cranston, R. I.

Designated G. S., the control unit is preassembled, factory tested, and ready for installation on the job. All necessary fittings, unions, checks, strainers, volume control, shutoffs, dial thermometer, and thermostatic water mixing valve are assembled in a locked, steel cabinet with a removable, black Formica, panel board.



Plumbing connections consist of three couplings; all parts can be replaced on the job without disturbing pipe connections. No factory repairs are necessary.

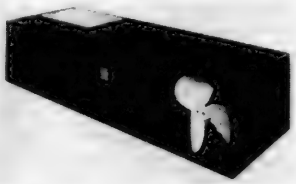
The unit is available in six standard sizes for group or gang control, in modern cabinets furnished in colors to match the shower room. Other models are available in units of three or four controls for progressive or zone showers.

More information? Circle Item 41 on postcard, page 125.

Mobile Air Conditioner

A commercial air conditioning unit has been designed for use in display vans, bookmobiles, and mobile stores by Ellis & Watts Products, Inc., Cincinnati, Ohio.

Cooling, humidifying, dehumidifying, filtering, and heating are incorporated in a single package. The units are self-contained and require only electricity to operate. They are built to fit locations inside or outside of a van with access for service and maintenance and are designed to withstand vibration, acceleration, shock, or other road hazards such as salt spray, mud, sand, and stones.



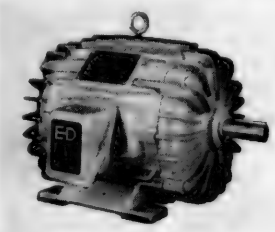
Mobile air conditioners are available in capacities from 1 to 20 tons. Their two independent cooling systems feature a starting lockout control, which reduces inrush current and eliminates the need for a large generator. The hermetically sealed refrigeration system is air cooled.

Units of any capacity, configuration, control requirements, or functions can be fabricated to meet specific requirements.

More information? Circle Item 42 on postcard, page 125.

Motor Has Smaller Frame

A totally enclosed, non-ventilated or fan cooled motor is being made by Electro Dynamic Div., General Dynamics Corp., Bayonne, N. J., to conform to the dimensional standards recently adopted by NEMA. The motor has been designed more compactly than the previous NEMA design, utilizing less space and developing a larger horsepower output.



Designated as type H, the motor is designed for operation where non-combustible dust and moisture are prevalent. The housing and end brackets are constructed of a solid, cast iron, ribbed frame.

Motors are now in production on the 182, 184, 213, and 215 frames. Larger ratings will also be available in the rerated frame sizes.

Previous design NEMA frames 203 through 505 totally enclosed, fan cooled, are still being produced for customers preferring the larger frames.

More information? Circle Item 43 on postcard, page 125.

Pipe and Valve Templates

A matched set of five reversible templates for drawing general layouts or details of valving and piping systems is made by A. Lawrence Karp, Greenwich, Conn.

At least 5000 commonly used pipe, fitting, and valve diagrams can be pencil drawn by using the cutout symbols on the templates singly or in combinations. Layouts made with them can be used for fluid or gaseous processes such as pipelining, refining, pumping, pneumatic, hydraulic, plumbing, heating, refrigeration, steam, high pressure, drainage, sprinkler, and vacuum.

A complete kit consists of four 5⅜ x 9⅞-in pipe, pipe fitting and valve indication templates and one dimensioning template. The four larger templates may be ordered individually. All are made of rigid, non-glare, vinyl plastic.

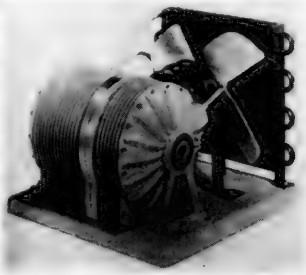
The company offers its 1956 catalog and manual of over one hundred other templates for drafting and engineering purposes. This is included with orders or shipped free on request.

More information? Circle Item 44 on postcard, page 125.

Lightweight Compressor

A lightweight hermetic compressor is announced by Harv-O-Metic Co., Los Angeles, Calif.

A cast aluminum shell, with outside dimensions of 8¾ x 6⅝ in., provides the housing for each of the ⅛, 1 6, or ¼-hp models of the compressor. The ¼-hp motor-compressor assembly, which may be held in a man's hand, weighs less than 23 lb. The fins of the compressor shell furnish a larger heat-dissipating surface, while internal circulation of the refrigerant vapor assures a low internal operating temperature.



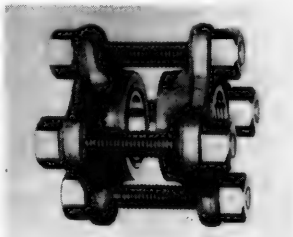
A design feature permits the operation of the compressor in either a horizontal or vertical position. The unit is covered by a two-year warranty. The firm will also offer complete condensing units; they will be available in fan-cooled or static types, for high or low starting torque.

Production is proceeding on the ⅛, 1/6, and ¼-hp models and will be followed a little later by the ⅓, ½, and ¾-hp sizes with slightly larger dimensions and a little increase in weight.

More information? Circle Item 45 on postcard, page 125.

O-Ring Flange Unions

A line of 2-bolt and 4-bolt flange unions with O-ring seals is offered by W-S Fittings Div., H. K. Porter Co., Inc., Roselle, N. J. The unions are used in hydraulic equipment lines, process piping, water lines, refrigeration piping, and other applications. The O-ring provides a seal against fluid pressure. The flanges are made of high strength forged steel with high tensile studs.



The unions are available in the 3000-lb class in both screw-end and socket-welding types. The 2-bolt unions are available in sizes ¼ to 1¼ in., the 4-bolt union in sizes 1 to 2 in. The O-rings are available in a variety of molded materials to resist a range of service conditions.

More information? Circle Item 46 on postcard, page 125.

Constant Pipe Supports

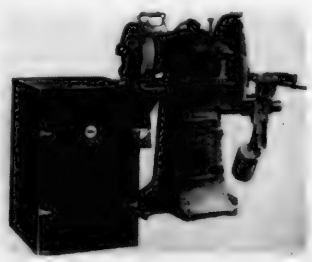
An extended line of constant support hangers (Model R) with load capacities from 31 to 32,267 lb is announced by Grinnell Co., Inc., Providence, R. I. The hangers permit the expansion and contraction of piping systems, through heating and cooling cycles, without developing dangerous stresses.

The line offers increased supporting forces or greater travel within a given frame size to provide any load or travel the customer may require. There are nine frame structures available. Two of them are completely new. The field adjusting bolts have been relocated for easier load readjustment. The bearings have been relocated in the frames, permitting the main pivot to rotate and carry the load indicating pointer. Four of the frame designs require less head room and permit installation closer to other structures. To simplify erecting new piping, stops are provided to lock the hanger in a fixed position. The stops are also used during hydrostatic tests.

More information? Circle Item 47 on postcard, page 125.

Dust Collector Rating Increased

The horsepower rating of the Model 64 dust collector has been increased from ½ to ¾ by Torit Mfg. Co., St. Paul, Minn.



The collector can be used with double-end, pedestal grinders having wheels up to 10 in. in diameter, single spindle disc grinders or sanders up to 18 in. in diameter, tool and cutter grinders, polishing and buffing wheels, surface grinders and lathe operations involving cutting or grinding that create noxious dust.

Twenty-four cloth filters in the cabinet-type unit provide 60 sq ft of filtering area. When used with one 4-in. inlet, the unit moves 500 cfm of air at 5700 fpm air speed and a static pressure of 4 inches of water. The unit may also be ordered with either one or two 3-in. inlets.

Dimensions of the unit are: height 33 in.; width 22 in.; depth 24 in.; and shipping weight 270 lb.

More information? Circle Item 48 on postcard, page 125.

3 Air Conditioner Styles

A remote type room air conditioning unit, called Roomaire and providing year-round air conditioning of individual rooms in multi-room installations, is available in three styles from Young Radiator Co., Racine, Wis. The three styles are: Type CFW, a concealed floor model; Type CHW, a concealed horizontal model; and Type HW, a horizontal cabinet model.

The concealed floor models are designed for built-in installations in an outside wall, either directly below the window sill, or in back of a finished wall panel. Air is discharged from the top of the unit through a duct connected to an outlet grille in the window sill or wall. Air is returned to the unit through a return air grille located in a removable panel that provides access to the unit and built-in space. Outside air can be introduced through the opening in the back of the unit.

The concealed horizontal models are usually installed either in a closet or in a drop ceiling or furred space. Return air is brought to the unit through a plenum created by the closet or furred space. A plenum housing the fans and containing filters can be furnished as optional equipment. Conditioned air is discharged from the unit through a short duct terminating in an outlet grille located in the wall or ceiling of the space served by the unit.

The horizontal cabinet models, with deluxe finished casing, are designed for exposed installation at the ceiling and are suitable for installations where floor space is limited. Stamped outlet and inlet grilles are standard equipment. Adjustable discharge grilles can be furnished as optional equipment when specified.

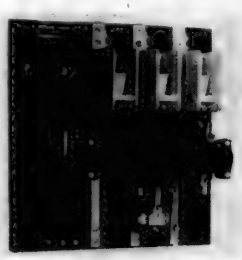
For cooling, chilled water is circulated through the coil in the unit; and for heating, hot water. Three pipes serve each unit: water supply, water return, and drain. The air conditioners are available in three sizes of 200, 400, and 600 cfm, with nominal cooling capacities of ½, 1, and 1½ tons.

More information? Circle Item 49 on postcard, page 125.

Oil Burner Safety Control

A remote control switch for oil burner panels has been developed by Automatic Switch Co., Orange, N. J.

Designed to New York City Board of Education specifications, the switch is arranged to disconnect the power supply from the oil burner circuits automatically upon the operation of a *break glass* type station through a relay holding circuit.



Basic components of the switch include: a mechanically held, 3-pole, remote control switch that may be used up to its full ratings on all classes of load; a heavy duty power relay; a separately mounted oil burner *break glass* switch; and a momentary contact, push button station with one normally-open and one normally-closed contact.

Upon opening the *break glass* station contact or upon depressing the open button on the panel, the power relay is de-energized completing a circuit through the main switch coil. The switch opens, disconnecting the oil burner circuits. Resetting the switch must be made from a control station located at the panel and is impossible unless the *break glass* station switch contact is closed, that is, unless the broken glass has been replaced.

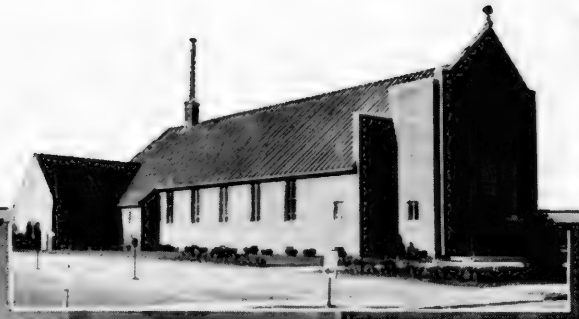
More information? Circle Item 50 on postcard, page 125.

(*Continued on page* 146)

St. John The Baptist Church

Rome, N. Y.

Architect: FRANK W. BRODRICK, Syracuse, N. Y.
Engineer: MALCOLM B. MOYER, Syracuse, N. Y.
Gen. Cont.: JAMES PAOLINI CONST. CO., INC., Syracuse, N.Y.
Heat Cont.: O'SHEA SUPPLY CO., INC., Rome, N. Y.



The beauty of heating a church by radiant panels is that traditional as well as modern architectural design may be used without having to make allowances for outlets or radiators in your design. It is the number one method of heating churches and similar permanent structures. And, when installation is completed panels are invisible. Also, when Revere Copper Water Tube is used it is easily and readily installed, easy to bend, requires no thread cutting and the solder or compression fittings used are readily made. There are fewer of these fittings and they are tight, trouble-free fittings when finished.

A radiant panel heating system of Revere Copper Tube is a long-lasting one, too, which is mighty important in a permanent structure such as a church. For copper tube cannot rust, its endurance has been proved for centuries.

So never mind what the other fellow says . . . *you* keep out of trouble with copper. Use Revere Copper Water Tube for radiant panel heating, hot and cold water lines, underground service lines, processing lines, waste stack and vent lines. Your Revere Distributor has plenty of stock these days, in all the required sizes.

IN THE LARGE PHOTO ABOVE NOTE THE NEAT LAYOUT, the even, easily-bent lengths of Revere Copper Water Tube, the few number of fittings . . . only every 60' in the panels. 5,000 ft. of tube was used in sizes ranging from ¾" to 1½". The architect and contractor tell us that the suggestions made by one of Revere's Technical Advisors were most helpful in both the planning and installation stages. Why don't you take advantage of this service? No obligation, naturally.

REVERE

COPPER AND BRASS INCORPORATED

Founded by Paul Revere in 1801

230 Park Avenue, New York 17, N. Y.

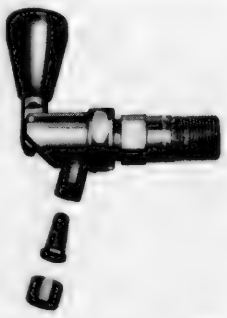
• • •

Mills: Baltimore, Md.; Chicago and Clinton, Ill.; Detroit, Mich.; Los Angeles and Riverside, Calif.; New Bedford, Mass.; Rome, N.Y.—Sales Offices in Principal Cities, Distributors Everywhere.

(*Continued from page* 144)

Faucet for Hazardous Fluids

A stainless steel faucet with a protective, corrosive resistant anti-flash screen in the nozzle is introduced by Economy Faucet Co., Newark, N. J. Designed for use with volatile and inflammable solvents or other hazardous fluids, the faucet is manufactured in 304 stainless steel throughout, with chemically inert Kel-F seal rings.



The faucet permits full flow and has an automatic, positive shutoff action which prevents dripping. It can be disassembled for maintenance and cleaning, and the shank is supplied in interchangeable sizes of ⅜, ¾, and ½ in. with tapered threads to allow a tight fit in the bung threads of dispensing drums.

Greater operational safety has been achieved by eliminating metal-to-metal contact in the operation of the valve. All frictional contact is limited to the plastic seal rings moving against the inside walls of the body chamber.

The faucet is also available in chrome-plated brass for non-corrosive service.

More information? Circle Item 51 on postcard, page 125.

Mass or Volume Flowmeter

An industrial meter that measures either mass or volume flow of fluids regardless of their electrical conductivity and without being affected by accompanying variables, is being marketed by Fischer & Porter Co., Hatboro, Pa.

Known as the Ultrasonic Flowmeter, the instrument is based upon the requirements for measuring in-flight refueling flow rates for aircraft. The company will manufacture and sell it for industrial applications under license from The W. L. Maxson Corp., the firm that developed the instrument.

The rate of volume flow is measured by two transducers, each of which transmits and receives controlled pulses of ultrasonic energy across the pipe section—one diagonally upstream and the other diagonally downstream—sensing the difference in the number of pulses received. An increasing flow rate increases the number of downstream pulses and decreases the number of upstream pulses. The frequencies of the two pulsations cancel out the sonic velocity, leaving only the difference of the frequencies, which is proportional to the flow velocity. This system eliminates the effect of temperature and density on sonic velocity so that flow measurement is unaffected by these two variables, as well as by pressure, viscosity, gas bubbles, solids in suspension, electrical conductivity, or position of installation.

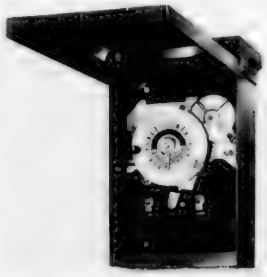
A third transducer, acting alone, may be added to the volumetric flow rate meter to give density measurement, converting the instrument into a mass flowmeter.

Present designs have a capacity up to 12,000 lb per min, with a fluid density range of approximately 2.5 to 1. It can be adapted to standard pipe sizes down to 2 in. The temperature limit is minus 50 to plus 25 deg F, standard, and up to 750 deg with special provisions. The pressure limit is 150 and 300 psi standard, but it can be adapted to higher pressures. It has three volumetric rate ranges of 0—250, —500, and —1000 gpm. Linearity is within 1% of full scale, and accuracy is better than 2% of full scale.

More information? Circle Item 52 on postcard, page 125.

Outdoor Time Switch Case

A rain-tight case for several series of Intermatic time switches is announced by International Register Co., Chicago, Ill. It is designed for protecting the switch mechanism from harmful weather elements in outdoor installations and is approved by Underwriters Laboratories, Inc.



The case will accommodate the TS60, standard *on-off* Series, and the TS66 standard switch with the skipper feature which permits operation on selected days. It will also accommodate both the T670 Series, which has specially designed trippers for timing from 5 to 60 min, and the T960 Series, which can perform as many as ninety-six *on-off* operations daily.

Made of heavy-duty (.067-in.) welded steel with top-hinged doors, the case is 5¾-in. wide, 9¼-in. high, 3¾-in. deep. Knockouts, three on the bottom and one on each side, provide access to the terminal blocks. The complete mechanism can be removed by loosening three screws.

Some other features are a rain visor over the top of the door, a hasp for sealing or padlocking, and mounting holes. The case is finished in tan.

More information? Circle Item 53 on postcard, page 125.

Direct-Drive Blower

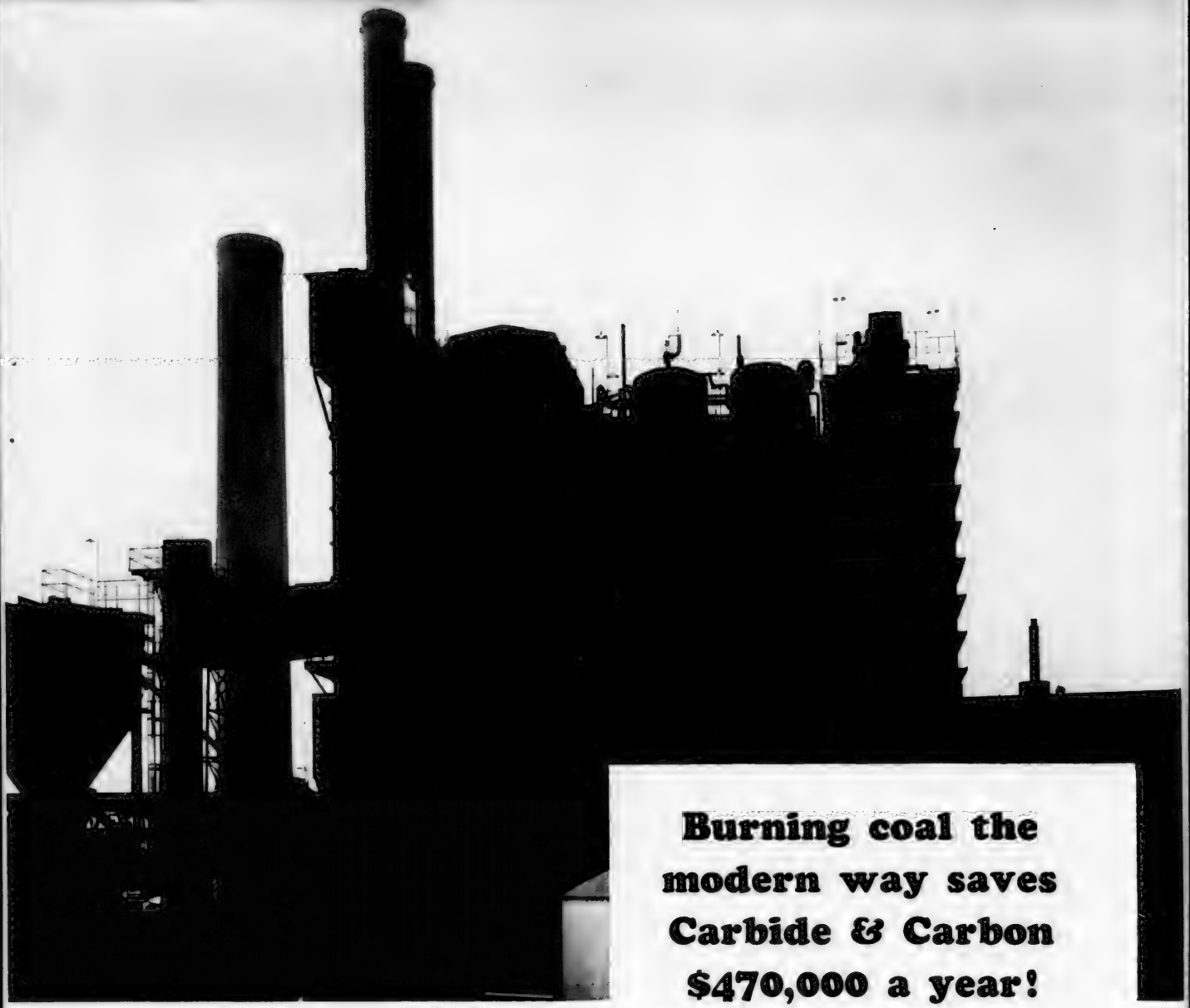
A direct-drive blower is available to manufacturers of heating, cooling, refrigerating and ventilating equipment from Utility Fan Corp., Los Angeles, Calif.

Designated the Big Boy, the blower has sufficient air flow capacity to handle up to a 125,000 Btu per hr, 3-ton, heating-cooling combination and will deliver approximately 1400 to 1500 cfm at a static pressure of 0.80 inches of water with low outlet velocity.

The blower has Neoprene hubs and a permanent split capacitor motor. The motor's speed may be controlled by a choke coil or reactor.

More information? Circle Item 54 on postcard, page 125.

(*Continued on page* 148)



Burning coal the modern way saves Carbide & Carbon $470,000 a year!

Two years ago Carbide & Carbon Chemicals Co. instituted a modernization program in the power department of its South Charleston, W. Va. plant. Utilizing latest steam-generating techniques and equipment, the firm replaced an outmoded installation with a 289,000-lb.-per-hr. boiler fired with pulverized coal, and completely revamped the rest of its power system.

Today, this program has resulted in impressive annual savings. Lower fuel and maintenance costs save $85,000 . . . increased efficiency, $175,000 . . . flyash re-use, $10,000 . . . lower electrical power generation costs, $150,000 . . . lower manpower costs, $50,000—a total savings of $470,000 a year *plus* continuing power service dependability at Carbide & Carbon.

For further information or additional case histories showing how other plants have saved money burning coal, write to the address below.

NATIONAL COAL ASSOCIATION
Southern Building, Washington, 5, D. C.

Consult an engineering firm

Designing and building hundreds of heating and power installations a year, qualified engineering firms can bring you the latest knowledge of fuel costs and equipment. If you are planning the construction of new heating or power facilities—or the remodeling of an existing installation—one of these concerns will work closely with your own engineering department to effect substantial savings not only in efficiency but in fuel economy over the years.

facts you should know about coal

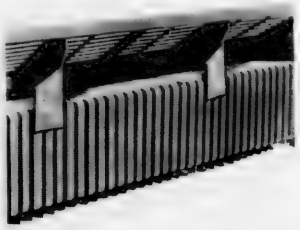
In most industrial areas, bituminous coal is the lowest-cost fuel available • Up-to-date coal burning equipment can give you 10% to 40% more steam per dollar • Automatic coal and ash handling systems can cut your labor cost to a minimum. Coal is the safest fuel to store and use • No smoke or dust problems when coal is burned with modern equipment • Between America's vast coal reserves and mechanized coal production methods, you can count on coal being plentiful and its price remaining stable.

(*Continued from page* 146)

Radiator Enclosures

A snap-on enclosure which can be installed on finned pipe radiators is announced by Slant-Fin Radiator Corp., Richmond Hill, N. Y.

Known as the Snap-on Slope Top, the cover was developed to simplify complicated and costly installations.



By means of seating brackets welded permanently inside, the entire cover can be snapped directly onto the heating element. Neither a mounting of hanging strips nor cover support brackets are required with the improved design. Sheet metal stiffeners are welded under the louvers as additional reinforcement. In addition, a flange is welded to the right hand end of each enclosure section to permit joining continuous runs of cover and for connecting to corner pieces and end plates.

The enclosures are available in stock lengths of 2, 3, 4, 5, 6, and 8 ft and, when specified, can be supplied in sizes to the nearest inch. They are made for 1-, 2-, and 3-tier heights with 3½- or 4¼-in. square fins or slant fins.

More information? Circle Item 55 on postcard, page 125.

Steam Operates Water Chiller

A 25-ton steam-operated water chiller, which has its own operating controls, is announced by Servel, Inc., Evansville, Ind.

The packaged unit requires steam and water connections and a 115-v electric line to operate the controls. It is factory-assembled, and both operating and safety controls are mounted inside the unit frame. With earlier 25-ton models, the installation of controls necessitated a separate engineering design project and local procurement of special parts.

Regulated by a thermostatic bulb in the chilled water line, the built-in controls provide continuous, automatic modulation to meet varying load conditions. Capacity is automatically reduced as low as 50% of rating with a corresponding reduction in steam consumption.

Process cooling applications include dissipating heat produced by machinery, removing heat of chemical reactions such as anodizing and electroplating, condensing volatile chemicals, and cooling canned and bottled products for processing.

Industrial cooling uses include temperature and humidity control in such industries as sugar refining, printing, and textile manufacturing.

Steam to operate the chiller may come from any source. Because of its light floor loading and lack of vibration, the unit may be installed in basements or penthouses. As with the company's earlier water chillers, water is the refrigerant and lithium bromide the absorbent.

More information? Circle Item 56 on postcard, page 125.

Multi-Purpose Shutoff Valve

An all purpose shutoff valve with one moving part is introduced by Perry Valve Corp., Dover, N. J.

Valve Model AV-1000 (illustrated) for 1-in. tubing is 5 in. long overall, weighs 1 lb and will handle a flow of 50 gpm at a 50-psi pressure drop. The maximum working pressure of the valve is 3000 psig, and the required piloting control pressure is equal to the working pressure.

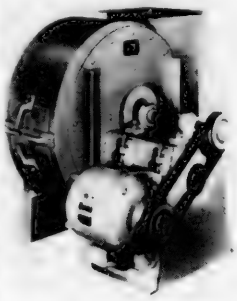
Special stainless steel construction is available for highly corrosive liquids or vapors.

More information? Circle Item 57 on postcard, page 125.

Waste Material Exhausters

Steel plate exhausters, designed to exhaust industrial waste materials, are new products of Chicago Blower Corp., Franklin Park, Ill.

Available with direct or V-belt drive, the exhausters are furnished with three different types of wheels that will meet materials handling or air requirements. The long shavings wheel is designed for handling wood shavings and material of a long fibrous nature, dusts, and materials such as alfalfa, buffing and grinding dust, hot gases and air. Fan blades are welded to two steel bars extending from the hub and designed for extra strength at points where greatest impact and wear occur.



The rim type wheel is the same as the long shavings wheel with the addition of side plates for added strength. This wheel is recommended for heavy material handling or where higher speeds are required. It can be furnished in Class II in all sizes where the requirements call for handling highly abrasive material.

The wool wheel is recommended for handling clinging-type, fibrous material which has a tendency to wrap itself around the blades of the long shavings wheel. This would include such materials as wool, cotton, rayon, and trim from corrugated box and paper machines. It is constructed with a heavy back plate, fins and steel spider and also utilizes a cone over the end of the hub.

Available in nine drive arrangements, the exhausters are placed into two classes: Class I is advised for temperatures ranging from 70 to 600 deg F. Class II for temperatures from 601 to 1000 deg. Temperatures above 1000 deg call for special construction. Wheel diameters from 9½ to 60½ in. and volumes up to 50,540 cfm are made.

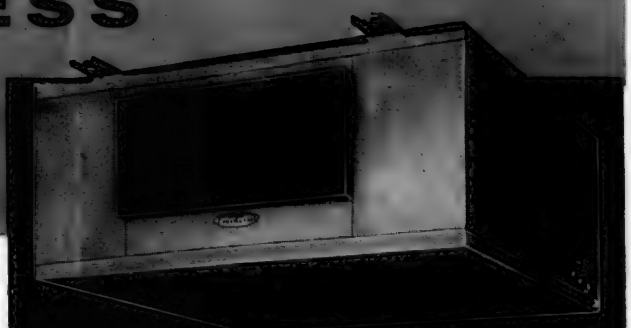
Bulletin SPE-103 gives detailed specifications and information.

More information? Circle Item 58 on postcard, page 125.

(*Continued on page* 150)

ANOTHER "BEST BUY" BY PEERLESS

Weather Beam Air Conditioner

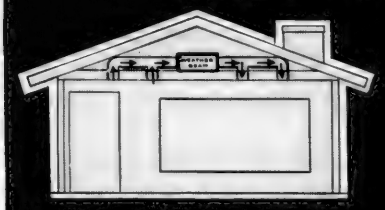


For Connection to Remote Direct Expansion or Chilled Water Cooling System or to Remote Hot Water Heating System

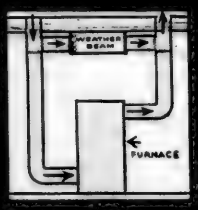
For a satisfactory air conditioning installation, choose the Peerless Weather Beam. Its high efficiency, beauty, ease of installation, accessibility to working parts and freedom from service assure maximum profits on any job. The Weather Beam is engineered and built to meet the needs of any contractor or service engineer who wants the best at a price he can afford to pay. ON TIME DELIVERY IS ASSURED

The Duct Type Weather Beam is recommended for residential, commercial and small industrial buildings. The Ductless Type is adaptable for offices, stores, motel lobbies and restaurants.

DUCT TYPE



Attic Installation In Small Home



Suggested Hook-up In Warm Air Heating System

(Left) Installation in Crawl Space

DUCTLESS TYPE

Ceiling mounted. No waste of floor space. Internal bank of louvers controls air flow vertically and external louver bank controls air flow horizontally. No cold or hot spots in room.

Your request for new bulletin and confidential trade price list should be written on company letterhead.

2 AND 3 TON CAPACITIES

PEERLESS OF AMERICA, INC.

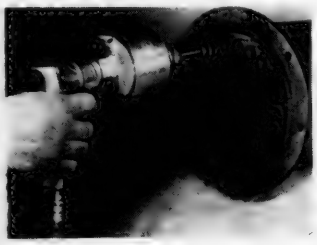
MANUFACTURERS OF REFRIGERATION AND AIR CONDITIONING COILS SINCE 1912

DEPT. A, 5830 NORTH PULASKI ROAD, CHICAGO 30, ILLINOIS, U.S.A.

(*Continued from page* 148)

Tube Expander

A tube expander drive called the Torq-Air-Matic, has been developed by Thomas C. Wilson, Inc., Long Island City, N. Y. It is air driven, and its control has torque output calibrated in terms of foot-pounds instead of arbitrary units of measurement.



Registering torque at the output spindle prevents tubes from being over-rolled or under-rolled. The readings are consistent regardless of tube sheet hole variations. This control feature also prevents overstressing of tube sheets and reduces warpage and ligament push-over.

The tool can be handled in the same manner as a conventional flue roller and will withstand the same abuse. It will produce 14 ft-lb of torque at 90 psi with a maximum air consumption of 12 cfm. The only connection required is the operating air hose.

The basic unit has a pistol-grip and is furnished with an auxiliary handle that may be swivelled to any position desired by the operator. An oil reservoir has been built into the handle. Control section is independent of the motor and lubrication is permanent. The chuck snaps on. The total weight with the auxiliary handle is approximately 7½ lb, and the length is 10 in.

More information? Circle Item 59 on postcard, page 125.

Ornamental Wire Grilles

Decorative wire grilles for heating units and similar ornamental needs are manufactured by E. H. Titchener & Co., Binghamton, N. Y.

The wire grilles can be varied in design and built with dimensions to meet specific requirements. They are plated in brass or zinc, finished to a high luster, and protected by a transparent coating of baked lacquer. Welded wire assemblies are available in round, flat, square, or half-oval wire, and in any combination of these types. In addition to rectangular grids, other geometric figures such as rings and spirals can be incorporated in the decorative designs.

More information? Circle Item 60 on postcard, page 125.

Sump Pumps Are Redesigned

A line of sump pumps has been redesigned by The Deming Co., Salem, Ohio, to permit the selection of a pump for particular capacity and head requirements regardless of sump depth. The pumps can be supplied for sump depths from 2 to 11 ft in multiples of 1 ft for any pumping requirement.

The selection of pumps is based on capacity in gpm and total head in feet. Motor sizes range from ½ to 75 hp, and motor characteristics may also be specified.

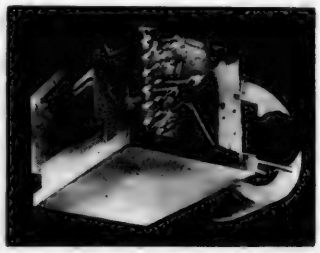
Standard single units include pump, support plate, motor, and control. A four-piece, liquid, end assembly permits servicing and maintenance. An axial shaft adjustment allows regulation of capacity and head and adjustments for impeller wear. Pumps range in discharge sizes from 1½ to 6 in. with capacities to 1000 gpm and heads to 75 ft.

Duplex models consist of two single pumps driven by separate motors and controlled by an alternator switch. Their construction is the same as the single units, except for the cover plate, which accommodates two pumps instead of one.

More information? Circle Item 61 on postcard, page 125.

Transom Air Conditioner

A remote type, transom air conditioner for cooling and heating multi-room units is available from Refrigeration Appliances, Inc., Chicago, Ill.



Two models bearing the company's trade name Krack are made for direct expansion, chilled water, and hot water applications. Optional three-speed fan control is offered for the units' direct-drive centrifugal fans.

The two models move 410 and 580 cfm, respectively. Their cooling capacities are 10,100 and 14,100 Btu per hr, for direct expansion, and 14,900 and 22,600 Btu per hr, for chilled water. Heating capacities are 21,600 and 38,000 Btu per hr.

The coil tubing is made of copper electroplated with tin; the fins are multi-tube and made of heavy gage aluminum. The fan motors feature an oil reservoir and are rubber-mounted on steel mounting brackets. The squirrel cage fan wheels are statically and dynamically balanced.

More information? Circle Item 62 on postcard, page 125.

Damper Is Automatic

An automatic damper that permits a central heating system to be used for either heating or cooling without manual changeover is introduced by Lennox Industries Inc., Marshalltown, Iowa.

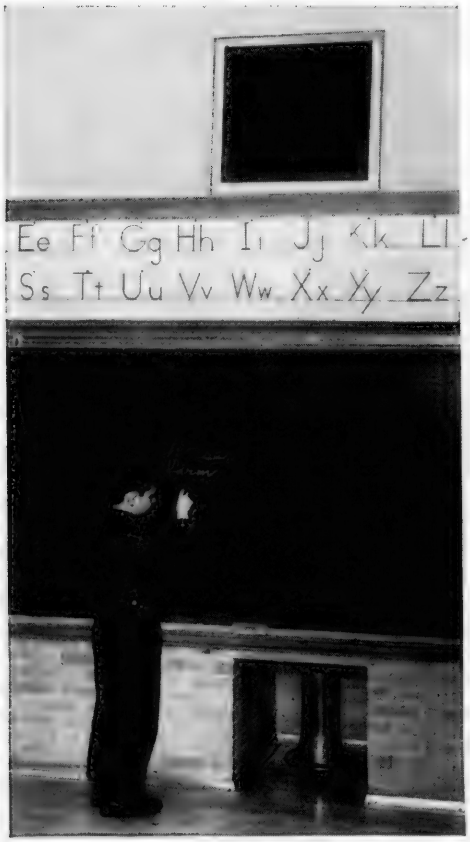
When the thermostat switch of the damper is flicked from heating to cooling, the operation of the air conditioner's blower opens the vanes on the air conditioner half of the damper and closes the vanes on the other half to bypass the inoperative unit. The damper vanes remain open until the furnace blower comes on either at the start of the heating season or during off-season cold spells. Then the air conditioner side of the damper closes and the furnace side opens automatically.

The vanes turn in Nylon bearings without need for a complicated damper motor or linkage.

More information? Circle Item 63 on postcard, page 125.

(*Concluded on page* 152)

How new heating and ventilating system cuts schoolroom construction costs . . .



Dunham VARI-AIR Unit, concealed in mixing flue behind blackboard, mixes fresh and recirculated air—silently diffuses it to classroom through overhead grille.

Dunham VARI-AIR—designed to help the "hard-pressed" budget . . . and save valuable floor space

School construction costs can't go anywhere but down when Dunham VARI-AIR heats and ventilates classrooms. This new system satisfies all health and comfort standards . . . does it at a cost that meets with full approval of any school board member.

In addition to healthful, silent heating and ventilating, VARI-AIR puts school air conditioning within easy financial reach of construction budgets. This optional use of VARI-AIR can be economically provided for when the system is installed.

Offers Numerous Advantages

Lower Costs: Dunham VARI-AIR eliminates need for in-the-room cabinet ventilators . . . provides greater savings in classroom heating construction costs. Total absence of complex controls saves both first and maintenance costs.

Minimum Temperature Variations: Dunham's centralized temperature control system holds room temperatures within prescribed limits by automatically compensating for weather change and heat loss.

Space Saver: No floor space in classroom is given over to either heating or ventilating with a Dunham VARI-AIR system.

How VARI-AIR Operates

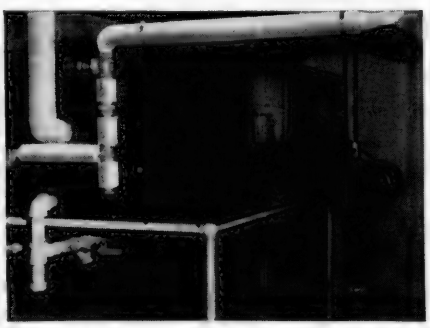
Only three primary parts to the system. VARI-AIR Units are concealed in wall spaces, mix fresh and recirculated air and diffuse it into classrooms.

Heating and Ventilating Unit—generally one to the entire system—pulls in fresh outside air, tempers, filters and discharges it through a tunnel or ceiling plenum to the VARI-AIR Unit.

Radiation—Dunham THERMO VECTOR® "along-the-wall" radiation saves floor space and provides all necessary heat whether used with steam or hot water.

For complete information, contact any Dunham Representative or mail the coupon.

Dunham Finned-Pipe Radiation runs along outside walls, under windows to eliminate chilling downdrafts, save premium classroom floor space.



Dunham Heating and Ventilating Unit pulls in outside fresh air and tempers, filters and discharges it through a tunnel or ceiling plenum to VARI-AIR Units.

Dunham VARI-VAC® Temperature Controls provide centralized operating station for *all* system settings and readings. This electronic "brain" helps system save up to 40% on fuel.

DUNHAM **HEATING & COOLING EQUIPMENT**

RADIATION • CONTROLS • UNIT HEATERS • PUMPS • SPECIALTIES

C. A. DUNHAM COMPANY • CHICAGO • TORONTO • LONDON

C. A. DUNHAM COMPANY
Dept. ACHV-3, 400 W. Madison Street
Chicago 6, Illinois
Please send VARI-AIR literature.

Name_____

Company_____

Address_____

City_____ Zone____ State____

(*Concluded from page* 150)

Paint for Hot Surfaces

A black paint for protecting surfaces subjected to temperatures up to 750 deg F is announced by Speco, Inc., Cleveland, Ohio.

Known as HSE (hot surface elastic) black, the paint is composed of a black pitch base bolstered with a silicone additive. This combination forms a coating that does not blister or become brittle when subjected to varied temperatures, smoke, fumes, mild industrial acids, alkalis, and moisture.

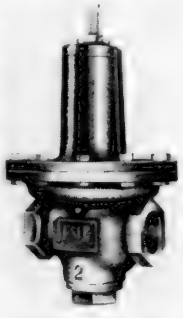
The paint dries in the air in 8 to 10 hours and does not require baking to be effective. As a result, it can be used as needed without interrupting regular schedules.

Recommended uses for the paint include the protection of heat lines, radiators, condensors, compressors, turbines, boilers, stacks, tanks, ovens, furnaces, steam lines, vats, separators, and exhaust manifolds. Applied by brush or spray, it is available in quart or gallon cans, 5-gallon pails, and 30- and 55-gallon drums.

More information? Circle Item 64 on postcard, page 125.

Water Pressure Regulators

A water pressure reducing valve is added to the line of regulators and controllers made by Leslie Co., Lyndhurst, N. J. The new classes are W-1 and WL-1 valves for water and other non-corrosive liquids.



Known as Hi-Flo, the regulators have regulation features that provide a constant flow at reduced pressure under variations and surges in inlet pressure. They are available in ½, ¾, 1, 1¼, 1½, and 2-in. compound treated, cast iron bodies. Inlet pressure range is from 10 to 250 psi at 180 deg F with reduced pressure ranges of 5 to 30 psi or 25 to 80 psi. The minimum pressure drop is 5 psi.

More information? Circle Item 65 on postcard, page 125.

Fuel Oil Gel Inhibitors

The formation of copper mercaptide gel in fuel oil systems can be inhibited with a combination of inhibitors made by Monsanto Chemical Co., St. Louis, Mo.

Mercaptans in fuel oil react with the copper in brass components of fuel oil burner systems to form a copper mercaptide. This combines with fuel oil to produce a yellowish translucent gel which clogs filter screens, causing faulty burner operation. Base fuels from Middle East crudes show a particular tendency to form the mercaptide gel. Their gel number is in the range of 500 compared to 160-165 for fuels from mid-continent crudes.

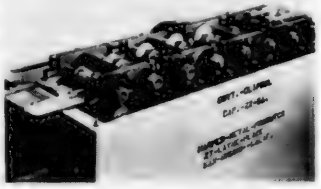
Mixtures of Santolene H and C in ratios of 2:1 to 10:1 have been tested and proved effective in fuels produced from both mid-continent and Middle East crudes. The mixtures have minimized gel formation when used in concentrations of 25 to 60 lb per thousand barrels, depending upon the base fuel.

Santolene H is a fuel oil additive designed to overcome screen and filter clogging and to inhibit rust and sludge formation in fuel oil. It also minimizes deposits of sludge and sediment on burner parts. Santolene C is a product-soluble rust and corrosion inhibitor for petroleum systems. It is used to protect tankers, pipelines, storage tanks and other petroleum product-handling facilities and is also used as a rust inhibitor in motor gasoline and jet aircraft fuels.

More information? Circle Item 66 on postcard, page 125.

Clip Forming Machine

A machine designed for the purpose of forming government clips (pocket lock) for ventilating duct connections is offered by Harper Metal Products, Ltd., San Bruno, Calif.



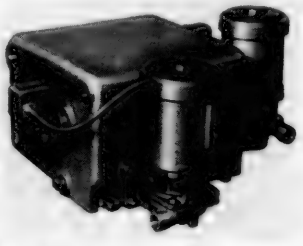
Called Cliprol, the unit is a combination roll and die machine that will form 70 to 80 ft per minute of government clips 1 x 1 x 1 in., with an approximately 3/16 in. extended lip to facilitate installation of the duct connection.

Powered by a 1½-hp, 3-phase, 60-cycle motor, the machine can handle 22-gage galvanized steel and lighter or 0.040-gage aluminum and lighter. It is equipped with a starter and V-belt drives and has a reinforced steel body, measuring 54 in. long and 22 in. wide with a 32-in. working height.

More information? Circle Item 67 on postcard, page 125.

Duplex Condensate Pump

A vertical type condensation pump with a cast iron receiver is announced by Hoffman Specialty Mfg. Corp., Indianapolis, Ind.



Called the Watchman, the pump is made of bronze and is fitted with a stainless steel shaft.

Made in one size only, the pump is available in single and duplex units. Two float switches are included on the duplex units. The rated capacities of the pump are as follows: 500 to 3000 sq ft EDR; 12 gpm; 14-gal receiver; and 7-gal between float stops. The discharge pressure of the pump is 20 psi; the inlet is 2 in. and the discharge ¾ in.

The pump is powered by a ⅓-hp (at 3450 rpm) single phase, a-c motor, operating on 115 or 230v at 60 cycles. The shipping weight of the pump is 300 lb, and it occupies 25 x 31 in. of floor.

More information? Circle Item 68 on postcard, page 125.

Beardsley Terrace Housing, Bridgeport, Conn. • Engineers: Frederick M. Hill and Paul D. Harrigan, New Haven.
Architects: Lindsay & Johnson, Bridgeport. • Heating Contractor: Bridgeport Pipe & Engineering Co., Bridgeport. • General Contractor: E & F Construction Co., Bridgeport.

Here's why Mechanical Engineer is **enthusiastic about Sarcotherm in 1200-family 16-building project**

AS Mechanical Engineer Paul D. Harrigan writes, "Sarcotherm steam heating controls in Beardsley Terrace Housing...working perfectly through extreme part of Winter as well as in Spring...sensitive, accurate and flexible...the Housing Authority, the architects and we ourselves are entirely satisfied."

Sixteen Sarcotherm Weather-Compensated Controls serve Beardsley Terrace. Of the continuous, modulated flow design, they provide individual zone control for the steam heating of each building. Precisely engineered orifice plates assure the proper steam flow to each heating unit.

COMPLETE SYSTEM — UNDIVIDED RESPONSIBILITY

Sarcotherm engineers cooperate in the preparation of working drawings and wiring diagrams for each job, and follow through with on-the-job help and supervision of installation.

Sarcotherm assumes undivided responsibility because the Sarcotherm System is COMPLETE—includes zone controls, panels, thermostats and steam specialties—traps, valves, and air eliminators.

Write for further details. Sarcotherm Controls, Inc., Empire State Building, New York 1, N. Y.

FEATURES OF SARCOTHERM CONTROL SYSTEMS

1. **Easy to install**—working drawings and wiring diagrams furnished for each job.
2. **Easy to maintain**—because of simplified construction, fewer parts.
3. **Easy to adjust**—to any desired setting.
4. **Engineered orificing**—assures even heat flow to all units from the start.
5. **Undivided responsibility**—by one maker, Sarcotherm, for the complete control system.

4003-B

Sarcotherm

An affiliate of SARCO COMPANY, INC.

WEATHER-COMPENSATED CONTROLS FOR **STEAM, HOT WATER AND RADIANT** *HEATING*

Degree-Days for January, 1956

(A) Airport readings; (C) City office readings; (O) Readings at a point on outskirts of city.

AIR CONDITIONING, HEATING AND VENTILATING's 28th Year of Publication of Monthly Degree-Day Data

City	January			Season to January 31, incl.*		
	1956	1955	Normal	1955-56	1954-55	Normal
Abilene, Texas (A)	668	591	516	1694	1447	1455
Albany, New York (A)	1279	1351	1318	4038	3757	3877
Albuquerque, New Mexico (A)	736	961	970	2228	2487	2727
Alpena, Michigan (C)	1330	1331	1358	4222	4028	4185
Anaconda, Montana (C)	1245	1321	1321**	4708	4164	4492**
Asheville, North Carolina (C)	937	867	724	2670	2690	1959
Atlanta, Georgia (A)	724	654	632	1959	1911	1757
Atlantic City, New Jersey (C)	978	976	905	2709	2565	2502
Augusta, Georgia (A)	682	639	521	1827	1795	1356
Baltimore, Maryland (C)	903	926	880	2652	2479	2417
Billings, Montana (A)	1331	1160	1305	4467	3422	4044
Binghamton, New York (C)	1234	1284	1218	3791	3586	3635
Birmingham, Alabama (A)	719	659	623	1961	1887	1751
Bismarck, North Dakota (A)	1867	1546	1730	5934	4510	5188
Block Island, Rhode Island (A)	1015	1066	1026	3094	2850	2962
Boise, Idaho (A)	970	1279	1169	3312	3553	3509
Boston, Massachusetts (A)	1057	1127	1113	3315	3035	3121
Bozeman, Montana (C)	1360	1407	1403**	4798	4282	4689**
Buffalo, New York (A)	1243	1240	1225	3734	3539	3649
Burlington, Iowa (A)	1297	1271	1271	3832	3446	3605
Burlington, Vermont (A)	1400	1509	1460	4438	4249	4319
Butte, Montana (C)	1364	1420	1309**	5005	4499	4492**
Cairo, Illinois (C)	942	838	856	2549	2285	2321
Charleston, South Carolina (C)	557	472	445	1332	1262	1103
Charlotte, North Carolina (A)	737	731	704	2083	2109	1978
Chattanooga, Tennessee (A)	828	768	725	2339	2265	2105
Cheyenne, Wyoming (A)	1112	1236	1225	3879	3640	4065
Chicago, Illinois (C)	1085	1193	1190**	3335	3135	3362**
Cincinnati, Ohio (C)	1002	967	942	2781	2624	2653
Cleveland, Ohio (A)	1151	1173	1132	3435	3223	3303
Columbia, Missouri (A)	1121	1024	1091	3163	2793	3058
Columbia, South Carolina (A)	683	647	538	1842	1852	1446
Columbus, Ohio (C)	1123	1072	1051	3249	2975	3046
Concord, New Hampshire (A)	1216	1357	1392	4231	3995	4231
Concordia, Kansas (C)	1238	1078	1144	3509	2820	3192
Dallas, Texas (A)	615	565	607	1566	1367	1477
Dayton, Ohio (A)	1193	1140	1094	3432	3212	3216
Deer Lodge, Montana (C)	1336	1445	1376**	4933	4572	4894**
Denver, Colorado (A)	955	1163	1125	3185	3179	3473
Des Moines, Iowa (A)	1392	1337	1330	4160	3549	3785
Detroit, Michigan (A)	1190	1196	1203	3550	3410	3528
Devils Lake, North Dakota (C)	1936	1770	1866	6327	5059	5661
Dodge City, Kansas (A)	1033	974	1076	3050	2639	3027
Dubuque, Iowa (A)	1404	1422	1414	4371	4013	4179
Duluth, Minnesota (C)	1591	1660	1696	5471	5029	5229
Elkins, West Virginia (A)	1211	1192	1017	3661	3558	3272
El Paso, Texas (A)	(a)	696	670	(a)	1630	1756
Ely, Nevada (A)	1019	1557	1302	3939	4379	4166
Escanaba, Michigan (C)	1373	1400	1473	4437	4199	4529
Evansville, Indiana (A)	1040	978	839	2959	2713	2654
Fargo, North Dakota	1826	1713	1795	5812	4882	5333
Fort Smith, Arkansas (A)	843	739	775	2259	1971	2048
Fort Wayne, Indiana (A)	1226	1216	1200	3670	3420	3565
Fort Worth, Texas (A)	625	580	622	1589	1397	1512
Fresno, California (A)	517	716	629	1452	1820	1640
Galveston, Texas (C)	291	301	356	689	592	758
Grand Junction, Colorado (A)	870	1265	1271	2970	3478	3564
Grand Rapids, Michigan (A)	1255	1259	1287	3845	3665	3879
Green Bay, Wisconsin (A)	1456	1526	1516	4633	4401	4551
Greensboro, North Carolina (A)	880	851	806	2550	2522	2319
Greenville, South Carolina (A)	739	689	673	2084	2093	1873
Harrisburg, Pennsylvania (A)	1015	1065	1051	3181	3029	3022
Hartford, Connecticut (A)	1133	1202	1178	3583	3361	3444
Hatteras, North Carolina (C)	777	649	527	1758	1542	1315
Havre, Montana (C)	1681	1466	1513	5650	3965	4753
Helena, Montana (A)	1495	1378	1469	5139	4417	4716
Houston, Texas (C)	320	336	378	782	701	843
Huron, South Dakota (A)	1732	1449	1597	5344	4201	4600
Indianapolis, Indiana (A)	1164	1156	1122	3454	3221	3263
Jackson, Mississippi (A)	635	578	535	1672	1520	1417
Kansas City, Missouri (A)	1143	1002	1085	3103	2598	2960
Knoxville, Tennessee (A)	890	808	760	2484	2400	2214
La Crosse, Wisconsin (A)	1527	1476	1528	4643	4152	4428

(a) Data not available.

*Heating season cumulative, from Sept. 1.

**Same normal figures as previously listed by HEATING AND VENTILATING since new figures are not available. All other normal figures in this table are based on a 30-year period covering 1921 to 1950, inclusive, recently compiled and published by the U. S. Weather Bureau.

Figures in this table, with eight exceptions, based on local weather bureau reports. Exceptions are Utica and Lewiston, figures for which are furnished through the courtesy of Coke Sales Department, Central New York Power Corp., Utica, N. Y., and Norman E. Ross, Busar, Bates College, Lewiston, Me., respectively; Anaconda, Bozeman, Butte, Deer Lodge and Livingston, Mont., through the courtesy of the Montana Power Company. Tacoma figures through the courtesy of the Tacoma News Tribune.

[Table concluded on page 156]

WHAT'S NEW?

Very little is really new. Today it's not a question of "newness," but of technical perfection. Tens of thousands of dollars have been put behind improvements in the quality of ALLOY PROPELLERS. The latest is Electronic Balancing making it possible to produce a twelve foot propeller that runs as smoothly as an electric clock!

ALLOY TYPE "E" PROPELLER
Type "E" propeller produced in a size range from 24 inches through 144 inches . . . ¼ horsepower through 200 horsepower with a CFM range from 3,500 to more than 450,000 CFM. In carbon and Stainless steel.

WHAT'S NEW WITH YOU? NOISE? CORROSION? CAPACITY? PRESSURE? DELIVERY SCHEDULE? COST? ALLOY PROPELLER can help you. We would consider it a privilege to help solve your problems with our unique mobile laboratory. Call on us.

ALLOY PROPELLER
ZELIENOPLE PENNSYLVANIA

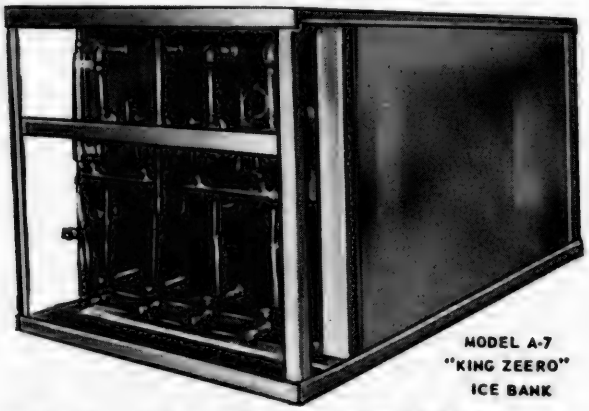
"King Zeero's" Sweet Water ICE BANKS offer ICE-CONCENTRATED Refrigeration for Air Conditioning

CONTINUOUS RIFLED GALVANIZED COILS
EXPANSION VALVE CONTROLLED

32°-34° COLD ICE WATER

DESIGNED FOR USE WITH:
FREON — METHYL CHLORIDE — AMMONIA

The "King Zeero" ICE BANK is designed for air cooling in Churches, Mortuaries, Theatres, Offices, Stores, Auditoriums, Factories, Clubs, Restaurants, etc. Ice Banks may be added to existing systems for increased capacity.



MODEL A-7
"KING ZEERO"
ICE BANK

The "King Zeero" ICE BANK is designed to deliver tons of 32 to 34 F. ice water for recirculation through air cooling coils. Peak loads many times compressor capacity are easily handled.

- DIRECTED COURSE OF WATER travels with "built-in" agitation.
- NO MECHANICAL AGITATION REQUIRED.
- LARGE WATER COMPARTMENTS spaced on 11" and 12" centers.
- 33% EXTRA ICE CAPACITY safely attained without freezing up.
- ICE IS "BURNED OFF" PLATE COILS progressively, exposing prime and secondary surface for maximum flash cooling capacity.
- ICE THICKNESS automatically controlled - eliminates "freeze ups."
- 94 SIZES to fit space requirements. Other designs for special applications.

CAPACITIES - 500 lbs. to 30,000 lbs. (72,000 B.T.U.'s to 4,320,000 B.T.U.'s) in a single unit. Multiple units may be installed.

MAIL COUPON TODAY

King Zeero Co., 4302 W. Montrose Ave., Chicago 41, Ill

☐ Please send me your new ICE BANK Catalog.

Name _____
Address _____
City _____ State _____

THE KING ZEERO COMPANY
4300-14 W. Montrose Ave., Chicago 41, Ill.

Degree-Days for January, 1956 (Concluded)

(A) Airport readings; (C) City office readings; (O) Readings at a point on outskirts of city.

AIR CONDITIONING, HEATING AND VENTILATING's 28th Year of Publication of Monthly Degree-Day Data

City	January			Season to January 31, incl.*		
	1956	1955	Normal	1955-56	1954-55	Normal
Lander, Wyoming (A)	1327	1299	1494	4461	4032	4803
Lewiston, Maine (O)	1144	1359	1452	4006	4019	4289
Lincoln, Nebraska (C)	1303	1228	1240	3783	3175	3483
Little Rock, Arkansas (A)	769	690	719	2047	1829	1898
Livingston, Montana (C)	1189	1221	1220**	4254	3858	3951**
Los Angeles, California (C)	271	345	328	758	669	779
Louisville, Kentucky (A)	999	966	933	2805	2680	2666
Lynchburg, Virginia (A)	883	913	846	2692	2665	2471
Macon, Georgia (A)	598	555	497	1598	1561	1321
Madison, Wisconsin (C)	1345	1421	1417	4224	3953	4124
Marquette, Michigan (C)	1300	1361	1435	4443	4263	4446
Memphis, Tennessee (A)	806	720	725	2146	1985	1973
Meridian, Mississippi (A)	647	616	561	1723	1665	1517
Milwaukee, Wisconsin (A)	1234	1335	1336	3958	3695	3947
Minneapolis, Minnesota (A)	1615	1571	1562	4978	4335	4552
Moline, Illinois (A)	1305	1329	1296	3905	3612	3722
Montgomery, Alabama (A)	623	573	517	1622	1599	1381
Nantucket, Massachusetts (A)	(a)	1078	1020	(a)	2905	3042
Nashville, Tennessee (A)	895	832	778	2468	2328	2150
New Haven, Connecticut (A)	1073	1122	1113	3328	3131	3258
New Orleans, Louisiana (C)	391	330	341	895	783	770
New York, New York (C)	995	1064	995	2903	2788	2766
Newark, New Jersey (A)	1013	1055	1039	3002	2859	2951
Norfolk, Virginia (A)	854	820	729	2224	2138	1986
North Platte, Nebraska (A)	1288	1378	1271	4294	3755	3835
Oak Ridge, Tennessee (C)	923	855	834	2628	2540	2421
Oakland, California (A)	485	638	552	1551	1623	1629
Oklahoma City, Oklahoma (A)	878	807	843	2478	2076	2210
Omaha, Nebraska (A)	1354	1242	1302	3972	3237	3670
Parkersburg, West Virginia (C)	1072	(a)	939	3013	(a)	2773
Peoria, Illinois (A)	1208	1248	1240	3647	3363	3552
Philadelphia, Pennsylvania (C)	954	972	933	2687	2599	2557
Phoenix, Arizona (A)	271	500	425	730	889	980
Pittsburgh, Pennsylvania (C)	1050	1051	992	3061	2942	2882
Pittsfield, Mass. (A)	1330	1411	1120	4363	4122	3798
Pocatello, Idaho (A)	1120	1483	1333	3798	4331	4060
Portland, Maine (A)	1161	1315	1373	4217	3939	4149
Portland, Oregon (C)	693	731	791	2466	2201	2391
Providence, Rhode Island (A)	1066	1139	1125	3438	3175	3320
Pueblo, Colorado (A)	1088	1086	1104	3118	2969	3383
Raleigh, North Carolina (A)	850	802	691	1546	2301	1857
Rapid City, South Dakota (A)	1294	1266	1361	4427	3608	4163
Reading, Pennsylvania (C)	995	1047	1017	3013	2889	2883
Red Bluff, California (A)	552	684	617	1516	1794	1559
Reno, Nevada (A)	953	1238	1048	3256	3632	3386
Richmond, Virginia (A)	896	898	828	2574	2510	2360
Rochester, New York (A)	1296	1282	1249	3884	3651	3722
Roswell, New Mexico (A)	703	807	787	2029	2151	2202
Sacramento, California (C)	512	680	614	1380	1783	1594
St. Joseph, Missouri (A)	1241	1152	1017	3550	2994	2826
St. Louis, Missouri (C)	1060	954	983	2873	2594	2686
Salt Lake City, Utah (A)	908	1363	1194	3133	3547	3473
San Antonio, Texas (A)	411	376	462	1020	782	1062
San Diego, California (A)	290	336	317	735	642	795
Sandusky, Ohio (C)	1186	1156	1122	3413	3162	3238
San Francisco, California (C)	405	514	462	1397	1453	1343
Sault Ste. Marie, Michigan (A)	1498	1489	1587	4876	4642	4927
Savannah, Georgia (A)	568	525	424	1445	1471	1099
Scranton, Pennsylvania (A)	1222	1225	1141	3785	3419	3395
Seattle, Washington (C)	714	693	679	2689	2220	2435
Sheridan, Wyoming (A)	1352	1253	1392	4611	3817	4437
Shreveport, Louisiana (A)	569	528	550	1492	1331	1398
Sioux City, Iowa (A)	1489	1321	1423	4448	3635	4131
Spokane, Washington (A)	1114	1173	1243	4181	3741	3948
Springfield, Illinois (A)	1204	1143	1116	3476	3133	3114
Springfield, Missouri (A)	1071	949	1001	2977	2628	2834
Syracuse, New York (A)	1307	1354	1225	3912	3692	3565
Tacoma, Washington (C)	724	713	797	2724	2337	2647
Toledo, Ohio (A)	1266	1213	1197	3837	3434	3561
Topeka, Kansas (C)	1191	1024	1088	3265	2688	2979
Trenton, New Jersey (C)	1014	1057	1004	3001	2872	2856
Tulsa, Oklahoma (A)	904	780	856	2409	1972	2238
Utica, New York (O)	1349	1434	1248**	4069	3990	3785**
Valentine, Nebraska (A)	1405	1271	1361	4611	3665	4070
Walla Walla, Washington (C)	931	948	1023	3215	2769	2989
Washington, D. C. (C)	926	909	884	2632	2543	2488
Wichita, Kansas (A)	1094	930	1023	3007	2477	2786
Williston, North Dakota (C)	1800	1573	1705	5872	4427	5200
Winnemucca, Nevada (A)	934	1456	1153	3570	4196	3748
Yakima, Washington (A)	1161	1096	1181	4097	3465	3650

For footnotes, see page 154.

the impulse that revolutionized steam trapping

YARWAY IMPULSE STEAM TRAP

the only moving part

...a small stainless steel valve that literally floats on the condensate load. Gets equipment *hot in a hurry*—and *keeps it hot!*

Twenty years ago YARWAY applied a unique theory of thermodynamics to steam traps—and gave industry the amazing YARWAY Impulse Steam Trap.

Today — over a million YARWAY Impulse Steam Traps later — advantages like the following continue to convert new users, and convince old users to standardize on the YARWAY Impulse:

- **QUICK HEAT-UP AND EVEN TEMPERATURES OF EQUIPMENT**
- **GOOD FOR ALL PRESSURES WITHOUT CHANGE OF VALVE OR SEAT**
- **SMALL SIZE—LIGHT WEIGHT**
- **ONLY ONE MOVING PART**
- **STAINLESS STEEL—minimum maintenance**
- **WON'T FREEZE UP**
- **A COMPLETE LINE of sizes and types for every requirement**
- **IMMEDIATELY AVAILABLE from 270 local Industrial Distributors**

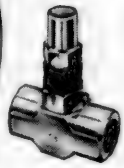
For free Trap Selector, or 24 page Bulletin, write

YARNALL-WARING COMPANY
104 Mermaid Avenue, Philadelphia 18, Pa.

SERIES 60 and 120

For all *normal* trap requirements, pressures to 400 and 600 psi.

½" No. 20-A

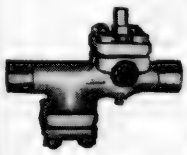


For *light loads* on tracer lines, steam mains, small presses, etc.

SERIES 40

For *heavy loads* requiring extra high capacity steam traps.

INTEGRAL-STRAINER HIGH PRESSURE TRAP



For *high pressures, high temperatures.* (Flanged or welding connections.)

YARWAY **IMPULSE® STEAM TRAP**

OVER 1,000,000 YARWAY IMPULSE STEAM TRAPS USED

NEWS OF THE MONTH

N. Y. HOTELS

to be air conditioned. Hilton chain to spend $2.7 million.

Hilton hotels in New York City will be or now are being air conditioned, according to Joseph P. Binns, vice president of Hilton Hotels Corp., in charge of the Eastern Division. This program includes the Waldorf, New Yorker and Statler hotels and calls for an expenditure of $2.7 million.

The Waldorf, which now has 430 air conditioned rooms, will have an additional 400 rooms so equipped by June. At the Hotel New Yorker, the first five guest floors will be air conditioned by June. This includes guest rooms and show rooms.

• **BIGGEST.**—Work has started on the 2,200 rooms of the Hotel Statler which will make this the largest, completely air conditioned hotel in the world. It is expected that 500 rooms will be air conditioned by June 1, and the entire job completed by the end of this year. Two Carrier absorption type refrigerating units, each of 670 tons, will be installed on the roof.

ASHAE MEETING

draws 850 to Cincinnati. New officers initiate regional membership plan.

A registered attendance of approximately 850 at the 62nd Annual Meeting of the American Society of Heating and Air-Conditioning Engineers in Cincinnati, January 23-25, 1956, witnessed the installation of John W. James, Chicago, as president of the society. Mr. James, vice president of research, McDonnell & Miller, Inc., Chicago, Ill., succeeded retiring president John E. Haines, vice president, commercial division, Minneapolis-Honeywell Regulator Co., Minneapolis, Minn. Other officers installed with Mr. James are Peter B. Gordon, New York, first vice president; Elmer R. Queer, University Park, Pa., second vice president; Ralph A. Sherman, Columbus, O., treasurer.

• **HONORED.**—During the annual banquet on Wednesday evening, the new officers were installed by retiring president John E. Haines assisted by past-presidents L. N. Hunter, Johnstown, Pa., and Merrill F. Franklin, Philadelphia, Pa. Dr. Robert W. Keeton, Chicago, Ill, was honored as the first member of the medical profession to receive the Society's F. Paul Anderson Medal.

• **PLAN.**—Under a new regional plan, the chapters and branches of the Society in North America have been divided into seven geographical groups known as regional areas. Chapters Regional Committees will be comprised of one member and one alternate member selected by each Chapter within the respective area. The chairman of each Regions Central Committee, who will be known as a regional director, will be a member of the Society's Council. The seven regional directors will comprise the Regions Central Committee of which the second vice president of the Society will act as chairman.

The 1956 Council of the Society met on Thursday, January 26, with President James as chairman and First Vice President Gordon as vice chairman. The members of this committee are: Axel B. Algren, Minneapolis, Minn.; John Everetts, Jr., Philadelphia, Pa.; James N. Livermore, Detroit, Mich.; John H. Ross, Toronto, Canada; Bert W. Farnes, Portland, Ore.; Cary B. Gamble, New Orleans, La.; Walter A. Grant, Fayetteville, N. Y.; D. M. Mills, Houston, Texas; John H. Fox, Toronto, Canada; Arthur J. Hess, Los Angeles, Calif.; Charles H. Pesterfield, East Lansing, Mich.; Benjamin H. Spurlock, Jr., Boulder, Colo.; John E. Haines, Minneapolis, Minn.

It was announced that the Semi-Annual Meeting of the Society will be held June 18, 19, 20, 1956, in Washington, D. C., at the Shoreham Hotel.

The 62nd Annual Meeting was comprised of eight sessions during which 16 papers were presented and two symposiums were conducted. The symposiums were on air pollution and high velocity air distribution.

PLASTIC PIPE

will be approved for carrying drinking water by identification program to assure public of safety.

The Society of the Plastics Industry, Inc., and the National Sanitation Foundation jointly announce an identification program to assure the public of a safe, uniform quality in plastic pipe for use in systems transporting drinking water.

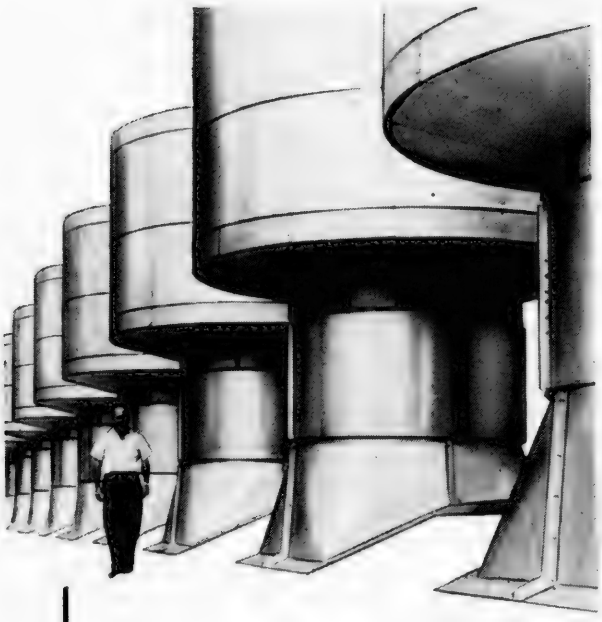
The program for applying the National Sanitation Foundation seal of approval to plastic pipe is the result of a research program of toxicity and taste studies which were made possible by the plastics industry more than three years ago. Today, as a result of this program, public health and water department officials, the public, industry, and users can now identify pipe that is free from toxicity or effects on taste when used for drinking water.

Health officers and the public have naturally been concerned about the possible effects of untried new materials in intimate contact with their drinking water. A study of plastic pipe, from a public health point of view, was undertaken to secure for health officers necessary basic information.

• **PIPE STUDY.**—The study included twenty-two samples of plastic pipe to determine their suitability for underground use in conducting cold drinking water. The tests performed were designed to show whether or not any substance that might be deleterious to health could be extracted from plastic by an aggressive potable water and if the passage of water through plastic pipe would affect the appearance, odor, or taste of the water.

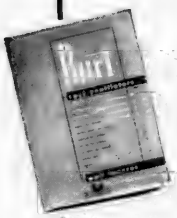
The twenty-two samples selected for study included the plastics most commonly used for conducting cold water, in addition to some proposed new formulations and a few

(*Continued on page* 160)



29 BURT FREE FLOW FAN VENTILATORS DO DOUBLE DUTY ON THIS STEEL PLANT

In this large steel plant, huge volumes of fumes and heated air must be exhausted during certain operations—lesser amounts during other production. Twenty-nine 72" Burt Free Flow Fan Ventilators with individual capacities of 81,000 CFM meet both needs efficiently. Burt Axial Flow cast aluminum fan wheels powered by 15HP, 860 RPM Class B insulated motors with shrouds and ventilating tubes, supply adequate air movement at peaks. At other times, their high wind band design provides extremely high air handling capacity as a gravity unit without the fan operating. If YOU need fresh air at low cost, let Burt engineers suggest—without obligation —the Burt Ventilators to do your task best.



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Write for Burt Data Book SPV-101-E. It supplies quick data on Burt's complete line of modern Roof Ventilators.

FAN & GRAVITY VENTILATORS
LOUVERS
SHEET METAL SPECIALTIES

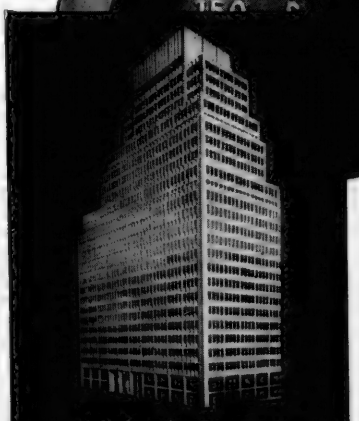
The Burt Manufacturing Company
49 E. South St., Akron 11, Ohio
Member Power Fan Manufacturers Association

In 99 Park Avenue, the last word in most up-to-date building methods and materials, as in other of the nation's newest, most modern office buildings and industrial plants,

Fairbanks Valves fill the specs.

FAIRBANKS VALVES

Proven to give longer service under difficult operating conditions, proven lower in maintenance costs!



99 Park Avenue

notable addition to the Manhattan skyline. New York City's first aluminum-faced skyscraper. A great construction achievement by the Tishman Realty & Construction Co., Inc., 445 Park Avenue, New York 22, New York. Architect: Emory Roth & Sons. Consulting Engineer: W. R. Cosentini & Associates, New York. Heating, Ventilating & Air Conditioning: Raisler Corporation, New York. Plumbing: John Weil Plumbing Corp., New York. Sprinkler: Raisler Corporation.

Men who know valves best specify and order Fairbanks Valves. For these men have learned that Fairbanks Valves insure trouble-free control of water, steam, gas, or oil. They know that Fairbanks Valves are engineered, designed, and manufactured to the highest standard of the industry. And they know that Fairbanks Valves fill their every requirement, for Fairbanks makes the complete line of bronze and iron body valves. YOURS Without obligation, send for Fairbanks Valves Brochure, describes, with cutaways, complete line of Fairbanks Valves.

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Valves • DART & Pic Unions • Trucks • Casters • Wheels

PLASTIC PIPE

(*Continued from page* 158)

plastics for comparative purposes that normally are not recommended for use with potable water. These samples are classified broadly as polyethylene, polyvinyl chloride (including Saran), rubber modified polystyrene, and cellulose acetate butyrate.

• **INSPECTION.**—Companies participating in the identification program will have their plants regularly inspected by National Sanitation Foundation officials and must meet minimum established standards. Such regular tests will be supplemented by surprise sampling. Their pipe will be tested regularly for possible effects on appearance, taste and odor of water. Manufacturers of the plastic raw materials used in plastic pipe must obtain National Sanitation Foundation approval of their material. They in turn will certify to their customers that they have such approval.

Through such controls and tests, the Foundation will be assured if compliance by the participating companies. Uniform marking of all pipe and fittings will assure the public of conformance to the standards set by the National Sanitation Foundation.

HEATER DEATHS

of six laid to public's ignorance of safety regulations. Engineering society makes effort to protect public.

The death of six persons from carbon monoxide asphyxiation in Miami, Florida, serves as a grim lesson in the efforts of plumbing and heating engineers to protect the public, according to Wendell M. Dillon, president of the American Society of Sanitary Engineers. The six deaths occurred when one of the victims blocked the flue of a gas heater.

• **IGNORANCE BLAMED.**—"It is unfortunate we must have accidents to awaken people to the need for respecting efforts to guard them from harm," Mr. Dillon said. "Now that it has happened, we should realize that a heater needs fresh air to breathe and that if a home is closed tightly while a heater is in operation, the oxygen in the home will become exhausted." He called this another illustration of the public's general lack of knowledge of the reasons behind many regulations for its safety.

• **EFFORT CITED.**—The society president described numerous activities of his organization aimed at protecting the public's health and safety.

"Plumbing is usually hidden behind the walls of homes and buildings and protective measures sanitary engineers have devised for the public safety also cannot be seen," Mr. Dillon explained. "We are trying to show the people, through out society, how devices which sometimes appear costly are actually inexpensive in terms of health and safety."

Mr. Dillon described the society's current campaign to adopt standardized codes and qualities of products, and reported progress among members of the industry traditionally devoted to the confining influence of guilds. The engineer admitted that the industry is not without responsibility for some of the public's lack of knowledge concerning health and safety measures in sanitation.

OVERHEATED SCHOOLS

may be reason for poor marks, teachers are told at New York meeting. Body heat of pupils is blamed.

If your youngster's report card is poor, maybe you should blame the heat, not the homework! Zephyrin A. Marsh, an expert on heating and parenthood (seven children), told some 100 leading Eastern educators at a meeting that overheated classrooms in a majority of the nation's schools were dulling the learning capacity of grade school children. The problem in schools this and any winter, he said, was not one of heating but of cooling.

• **LITTLE HEATERS.**—Mr. Marsh, director of Minneapolis activities, pointed out that twenty to thirty youngsters packed into an average classroom will generate enough excess body heat to warm a five-room house in freezing weather. It is this extra heat, he said, which is the principal cause of the overheating that makes pupils drowsy, inattentive, and difficult to instruct.

Conclusion of the delegates to the two-day Institute on Classroof Planning, sponsored by New York University, was that physical factors found in 90 to 95% of today's classrooms were hindering, not helping, the development of schoolchildren. The meeting discussed ways of improving classroom design to correct these faults.

REFRIGERATION

growing in importance to many fields as data on new refrigerants are extended.

Availability of thermo-dynamic data on at least 25 potential refrigerants with boiling points extending over a 400 degree range offers a distinct challenge to engineers to develop new equipment for extending the benfits of mechanical cooling. The field of refrigeration applications has barely been scratched, R. C. McHarness of the Du Pont Company's Kinetic Chemicals Division added in a talk to members of the American Society of Mechanical Engineers assembled in Chicago. Industry, he said, will rely heavily on engineering know-how in the next several years to apply cooling, particularly in the ultra-low temperature range, to the solution of many of its production problems.

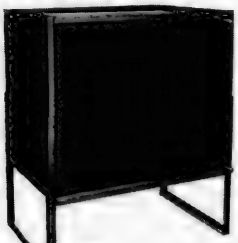
• **METALLURGY.**—Better, more versatile metals with added strength to withstand higher temepratures in various types of equipment might be obtained through use of refrigerants as low-temeprature quenching baths, Mr. McHarness pointed out. Such processing already has proved important in production of certain types of steel, where the crystal structure of the metal can be controlled by refrigeration to obtain much better dimensional stability.

(*Continued on page* 162)

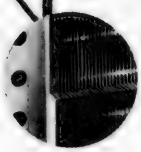
REMPE Air Cooling Equipment

Complete • Compact • Adaptable

REMPE Atmos-Therm®



The only Air-Cooled Condenser with these two Essential Features:

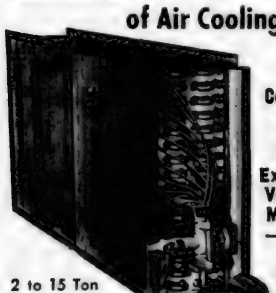


DESUPERHEAT SECTION
Large volume gas inset section. Hot gas from compressor expands slightly to accelerate its transfer from a dry gas to a wet vapor.

AIR BLEEDER BAFFLE
Return Bend Cover Plate perforated to permit measured amount of air to be directed over bends and headers.

- **Completely eliminates need for condenser water.**
- **Minimizes operating and service expense.**
- **Inside or outside installation.**
- **Outlasts cooling towers and evaporator condensers.**

REMPE Complete Line of Air Cooling Coils



Complete with Multi-Outlet Expansion Valves—Made-On—Ready to Install

2 to 15 Ton Capacities

4 ROW COILS—for residential jobs.
6 ROW COILS—for commercial jobs.

Precision engineered and built to insure top performance and to give trouble-free service.

When writing mention product.

We have complete facilities for fabrication of pipe coils—all types—all materials. Complete engineering service. Send details.

HEAT TRANSFER EQUIPMENT REMPE CO. Founded 1890

REMPE COMPANY

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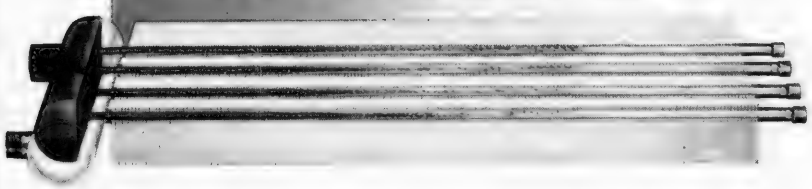
why accept this result?

Air near the steam supply header is heated while air near the return end is unheated
Temperature stratification mars system results
Condensate may be exposed to freezing



In conventional steam distributing tube surface the steam is apportioned equally among all the tubes and, under low modulation, the steam travels only partially across the surface . . . but in

Nesbitt HEATING SURFACE

WITH THE NEW TROMBONE DISTRIBUTING TUBES

The steam is apportioned to alternate tubes — a given quantity of steam travels twice as far in "trombone" tubes. Even the smallest quantities are distributed over the entire surface area.

Each trombone steam-distributing tube serves two adjacent condensing tubes from a single supply-header connection. Steam must travel across the first leg of the trombone tube (the full length of the surface) before reversing, under increased demand, to serve the second leg.

This entirely new principle of steam distribution eliminates stratification and the danger of freezing over the entire capacity range.

Therefore, Nesbitt Series T Surface is unmatched for heating and ventilating applications with modulating valve control and for preheating outdoor air.

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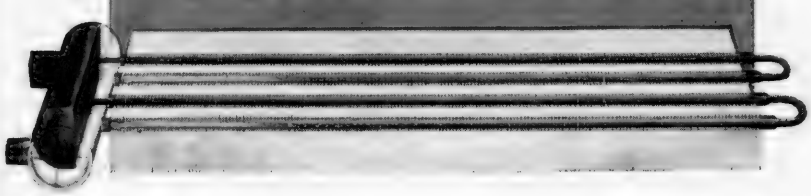
when you can have this!

Uniform final air-discharge temperatures over the full length of the surface
Ideal system results under modulated control
Positive inherent protection against freezing



REFRIGERATION

(*Continued from page* 160)

• **TEST CHAMBERS.**—Among other fields of investigation for engineers, the Du Pont chemist suggested a wide and relatively new field existed in design of equipment for environmental testing of the behavior of both men and materials.

The temperature range has been expanding, Mr. McHarness explained, until today people are considering the feasibility of environmental chambers that will cover the range from minus 250 to plus 600 deg F. Design of cascade refrigeration systems, utilizing extremely low boiling refrigerants to achieve such temperatures, is a distinct challenge to engineers.

• **GAS STORAGE.**—Storage of natural gas in its liquid form by cooling it below its boiling point is an important goal and will require a new concept of design in low-temperature refrigeration equipment, he added. A practical system for achieving and holding the low temperatures required would result in considerable saving in storage and transportation equipment. It might also provide an economical source of supplemental refrigeration in the cooling power of the liquefied natural gas when it is vaporized to its gaseous state for fuel use, Mr. McHarness said.

• **NUCLEAR RESEARCH.**—Low temperature refrigeration is also important in the field of nuclear research, he explained. In very high vacuum equipment such as the cyclotron, the use of a cold trap ahead of the diffusion pump helps remove condensibles and slow down the air molecules so that they are more easily entrained by the working fluid of the diffusion pump. Cascade systems have been used successfully, while a compound compression system using only Freon-13B1 refrigerant has been operated successfully at temperatures as low as minus 130 deg F.

These are a few examples of what the refrigeration engineer has been able to accomplish with the refrigerants and thermo-physical data which are available to him today, Mr. McHarness said. Other new uses will develop as we learn more about the tools we have to work with.

Possible refrigerants include everything from water, in absorption systems, he told the ASME, to methane. A dozen fluorinated hydrocarbon compounds, particularly useful because of their non-flammable, nonexplosive, and low toxicity characteristics, are available with boiling points ranging from minus 198 to plus 118 deg.

350 DEG WATER

heats jet engine plant with four types of space heating units. Two boilers supply system with heat.

A high temperature water heating system supplies the space heating for the new Reaction Motors' plant in Denville, N. J.

The selection of this type of heating system was figured as an alternate to conventional high pressure steam design. The system was specified when a saving of over 10% in initial investment was calculated and the anticipated operational advantages were described.

• **SYSTEM.**—The entire system consists of the following: A high temperature water central heating plant, a high temperature water distribution system, and a building space heating system consisting of (a) direct high temperature water finned radiators; (b) direct high temperature water unit heaters; (c) ventilating units with high temperature water heating coils; and (d) low temperature water finned radiators.

At present the heating plant contains two packaged, horizontal fire tube boilers of two-pass steel construction, designed for 150-psig working pressure. Each boiler has a rating of 500 hp and is capable of delivering 17,000,000 Btu per hr. Provision has been made for one future boiler of the same size. The fuel used is heavy oil.

• **CIRCULATION.**—The high temperature water is taken directly from the boiler and circulated to the buildings at a maximum temperature of 350 deg F. Two circulating pumps are presently installed—one acting as standby for the other. The head and capacity of the pumps can be increased for future load requirements by changing the impeller and motor.

The system was designed by American Hydrotherm Corp. of Long Island City, N. Y. Architect for the project was Frank Grad & Son of Newark, N. J. The general contract was awarded to the Ferber Co., of Hackensack, N. J., and the heating and plumbing contractor was Fred Wendel of Paramus, N. J.

TRADE ASSOCIATION

formed by manufacturers of air moving and conditioning devices to further own and public's interests.

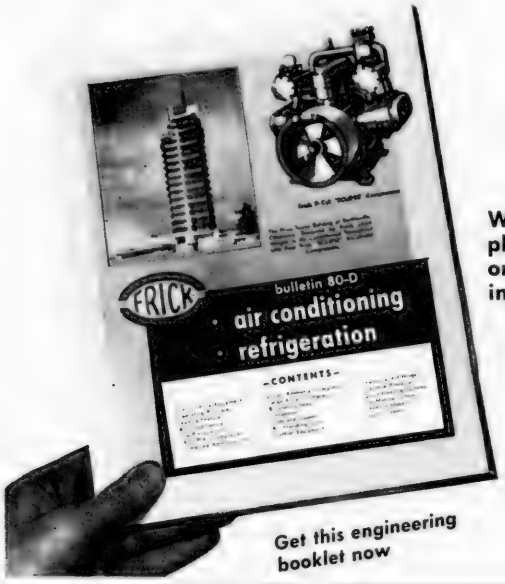
A new trade association, the Air Moving and Conditioning Association, Inc., was formed in Chicago, January 10, 1956, by forty-six manufacturers of air moving and conditioning devices, such as fan products, units combining fans and extended heating or cooling surfaces, or both, air washers, and similar products.

The purpose of the new association is to promote and further the interests of the manufacturer of air moving and conditioning devices and the interests of the public in manufacturing, engineering, safety, transportation, and other industrial problems. It also proposes to encourage the development of the science and art of engineering as related to air moving and conditioning devices as well as perfect methods for testing such devices for performance. The association intends to collect and disseminate lawful information of value to the membership, the industry, and the public regarding products and their application.

• **ORGANIZATION.**—Representing a range of products, the Association functions through products divisions, each of which is composed only of those members actively engaged in the manufacture of products included within the scope of a division. The original divisions established by the Association are as follows: Central Station Air Conditioning Unit Division; Centrifugal Fan Division;

(*Continued on page* 178)

Now most businesses require refrigeration!



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Whether you manage an ice rink or a restaurant, mechanical cooling plays a vital part in your operations. Today there's hardly a business or industry that doesn't benefit either from air conditioning, ice making, quick freezing, or other refrigerating work.

Frick Bulletin 80–D, just off the press, tells about the industry's most versatile and complete line of commercial and industrial cooling equipment—the line with nearly 75 year's experience built into it.

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POWER ROOF VENTILATORS

- Our new and complete line of power roof ventilators with their advanced modern design and new construction features fulfill today's architectural styling and job performance requirements.
- With MODULAR construction the following important features have been accomplished — low profile, maximum strength, maximum net free areas, complete resilient mounting with no metal-to-metal contact between the top cap and body, power section and body, and body to curb base.
- Seven top view sizes available from 30" x 30" overall, increasing by 6" increments to 66" x 66". Ventilator height varies in 5½" increments called the "MODULAR stack."
- Write for booklet that gives complete design, construction and performance data, and shows how to specify the correct Modular Roof Ventilator for maximum performance plus economy.

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BOOK REVIEWS

Publications abstracted in this department should be ordered direct from publisher.

AIR CONDITIONING REFRIGERATING DATA BOOK

The ninth edition of the Design Volume, Air Conditioning Refrigerating Data Book, contains fundamental data and basic engineering information. Editor-in-chief of this volume was Milo M. Bolstead, professor of mechanical engineering, University of Missouri, and he had the assistance of sixty authors and associate editors.

The chapter on Air Distribution was completely rewritten. Part 1 of the chapter on Control was rewritten to give a much fuller coverage of expansion valves and other refrigerant control devices. The arrangement used in this edition is substantially the same as that of the previous edition.

Included in the book is a classified section in which are listed manufacturers of components and assembled units of air conditioning and refrigeration equipment.

Air Conditioning Refrigerating Data Book, Design Volume, Ninth Edition, Milo M. Bolstead, editor-in-chief. Cloth bound 6 x 9 inches. Published by The American Society of Refrigerating Engineers, 234 Fifth Ave., New York 1, N. Y. Price, $10.

METAL CURTAIN WALLS

A conference was held in Washington, D. C., in September, 1955 sponsored by the Building Research Institute during which papers were presented on the subject of metal curtain walls.

This conference was sponsored by Aluminum Company of America. Committee of Stainless Steel Producers of the American Iron and Steel Institute, Davidson Enamel Products, Inc., Detroit Steel Products Company, Kaiser Aluminum and Chemical Corp., Owens-Corning Fiberglas Corp., Porcelain Enamel Institute and Reynolds Metals Company.

Papers were presented on architectural design, performance requirements in panel design, structural design techniques, panel insulation and condensation control, sound transmission, erection of metal curtain walls, and future outlook for metal curtain walls.

Metal Curtain Walls, edited by Charles R. Koehler. Paper bound. Publication 378, 8½ x 10¾ inches, 190 pages. Published by Building Research Institute, National Academy of Sciences, 2101 Constitution Ave., Washington 25, D. C. Price, $4.

• • •

WARM AIR HEATING—Five special manuals were recently issued by the National Warm Air Heating & Air Conditioning Association. The fifth edition has been published of Manual 3 dealing with Calculating Heat Losses. It covers the various steps in calculating heat losses and there is a table on the resistance values of common building materials. Price, $1.25. The fifth edition of Manual 4 on Warm Air Perimeter Heating as applied to structures with or without basements, covers the various parts of this design. Included are special work sheets for the design. Price, $1.50. Manual 6, second edition, is on Adjusting Winter Air Conditioning Systems for Maximum Comfort. It covers checking heat loss, thermostat location, heat input adjustment, air circulation and balancing. Price, $1. Also available is the fifth edition of Manual 9, Code and Manual for the Design and Installation of Warm Air Winter Air Conditioning Systems and Year 'Round Air Conditioning Systems. Price, $1. Manual 10, fourth edition, covers Four-Inch Pipe Warm Air Perimeter Heating. Price, $1. National Warm Air Heating & Air Conditioning Association, 640 Engineers Building, Cleveland 14, Ohio.

RATINGS FOR RESIDENTIAL AIR CONDITIONERS—ARI Interim Standard 620-56 on Published Ratings for Residential Air Conditioners defines the method of arriving at published ratings for residential air conditioners. This standard does not apply to room air conditioners or heat pumps. Air-Conditioning and Refrigeration Institute, 1346 Connecticut Ave., Washington, D. C. Price, 25 cents.

CAST BRASS SOLDER JOINT DRAINAGE FITTINGS—A standard for cast brass solder joint drainage fittings designed for use with copper water tube covers description, pitch, abbreviations for end connections, sizes, marking, minimum requirements for material and dimensions and tolerances. For a copy of ASA B16.23-1955 write to The American Society of Mechanical Engineers, 29 W. 39th St., New York 18, N. Y. Price, $1.25.

STANDARD METHODS OF TESTING AND RATING FORCED-CIRCULATING COILS—Test procedures for heating and cooling coils were adopted by the Heating and Cooling Coil Manufacturers' Association. This code was developed by the association working with the Air-Conditioning and Refrigeration Institute. For a copy of Bulletin No. 202, write to Heating and Cooling Coil Manufacturers' Association, 2159 Guardian Building, Detroit 26, Mich.

WELDING STAINLESS STEEL PIPING AND TUBING—A guide to serve as a means for avoiding difficulties in welding stainless steel piping and tubing has been published as a tentative American Welding Society committee report. This report, The Welding of Austentic Chromium-Nickel Steel Piping and Tubing presents information on the suitability of various stainless steel grades for welding pipe, suitable welding processes, the proper welding of filler metal, proper welding techniques and inspection methods. A table gives the specific welding rod or electrode to be used for welding each type of stainless steel. American Welding Society, 33 W. 39th St., New York 18, N. Y. Price, $1.

INSTRUMENTS AND CONTROL—Publication No. 55-21 has been issued by Edison Electric Institute to cover Instruments and Controls Practices for Recent Single Boiler Turbine Reheat Installations. Data were compiled for units ranging in size, pressure and temperature conditions from 50,000 to 260,000 kw, 1450 to 2400 psig and 950 to 1100F. Edison Electric Institute, 420 Lexington Ave., New York 17, N. Y. Price to non-members, $2.

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on any job

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. . complete range of units and sizes for every ventilating problem . .

Shown above, the PENN AIRETTE, one of the many versatile roof ventilators available for supply or exhaust purposes.

When you specify Penn Ventilator — you're specifying satisfaction . . proven through countless installations.

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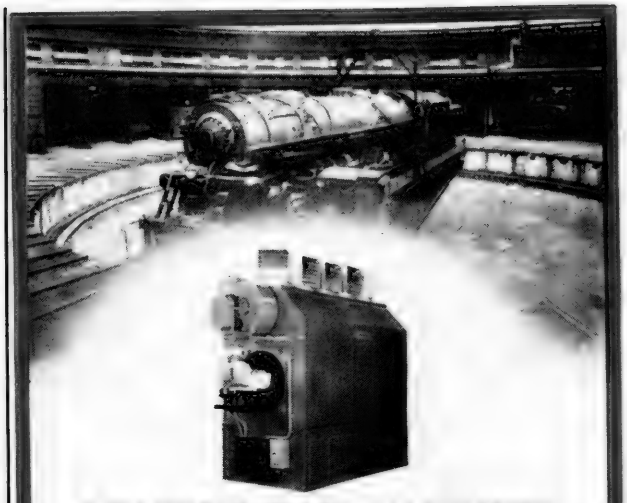

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DIRECT FIRED HEATERS

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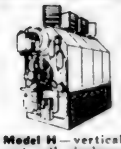
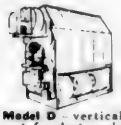
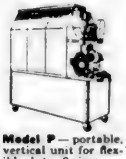


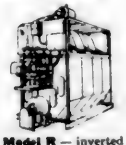
Model H — vertical unit with discharge heads. 12 sizes



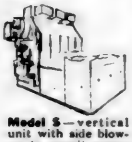
Model D — vertical unit for duct work. 12 sizes



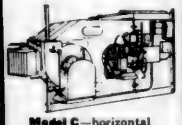
Model P — portable, vertical unit for flexible duty. 6 sizes.



Model R — inverted unit with discharge heads at bottom. 12 sizes.



Model S — vertical unit with side blowers to permit proper location of air mixing dampers. 12 sizes.



Model C — horizontal ceiling suspension unit for space saving. 12 sizes.

For placing heat where and when it is needed in roundhouses, locomotive and car repair shops this National Champion "Model H" does the job with the utmost efficiency and economy. National Champion Heaters are engineered to meet the most demanding requirements of industry. No matter what your heating need, there's a National Champion especially designed to fill the bill. National Heaters come in 6 models — 66 sizes from 200,000 to 2,000,000 BTU capacities. Check these outstanding features.

- 80% guaranteed heating efficiency
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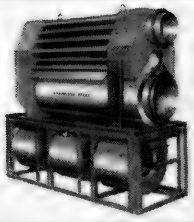
- Electronic flame failure control
- Completely wired, assembled and flame-tested at the factory to guarantee peak performance
- Listing by Underwriters' Laboratories, Inc.

Write today for complete information and specifications



American design Combustion Chamber the heart of National Champions

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Safer because it's Simpler

MAGNETROL

Boiler Water Level Controls

■ Of all boiler water level controls, we believe Magnetrol to be the safest. Certainly it is the simplest.

A PERMANENT Alnico magnet, located *outside* the float chamber, links boiler water level and electrical controls. This infallible magnetic link eliminates mechanical parts normally subject to wear and fatigue failure. *Pioneered and perfected by Magnetrol,* it provides almost unlimited operating life.

The brass "No-Scale" float chamber liner, another exclusive Magnetrol feature, is self-cleaning. It actually "flexes" off scale and prevents "sticking" of the float.

A magnetic sleeve, raised and lowered within a non-magnetic tube, "trips" or releases an Alnico permanent magnet attached to a mercury switch. Basically, this is Magnetrol.

These are just two of *many* advances for greater boiler safety found *only* in Magnetrol. *Standard* Magnetrol units are available for temperatures up to 750°F., at pressures up to 600 psi, for single stage (low water cutoff) or multi-level stage (pump control *plus* low water cutoff and alarm) service with as many as three separate switching actions. Special units are available for more extreme requirements.

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Gentlemen: Please send me Catalog Section III and full information on Magnetrol Boiler Water Level Controls.

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IN THE FIELD

The appointment of **Temp-Aire Wholesalers, Inc., St. Louis, Mo.,** as distributor for Airtemp commercial air conditioning equipment has been announced by **Airtemp Division, Chrysler Corp.** Temp-Aire Wholesalers, Inc., is headed by Mr. Guy Shaw who was formerly associated with Shaw Refrigeration Co., also of St. Louis. Under the terms of the new distributor agreement his company's marketing territory for Airtemp products will cover five counties comprising the greater St. Louis area.

Robert M. Nelson has been appointed district sales engineer for **Halstead & Mitchell,** as announced by Horace I. Schmidt, sales manager of the Pittsburgh, Pa., firm. He will be responsible for sales and field engineering of the company's cooling towers, air-cooled condensers, and water-cooled condensers throughout **northern Illinois, northern Indiana** and **western Michigan.** His headquarters are at **Morton Grove, Ill.**

Marlo Coil Co., St. Louis, Mo., has announced the appointment of **George Miller** as its representative in the **Denver area,** with offices at Denver, Colo.

A **Michigan sales territory** has been added by **Brunner Mfg. Co.,** Utica, N. Y., and **The Brunner Co.,** Gainesville, Ga. **John T. Yates** has been appointed district sales manager for the new territory. He will make his headquarters in **Detroit.**

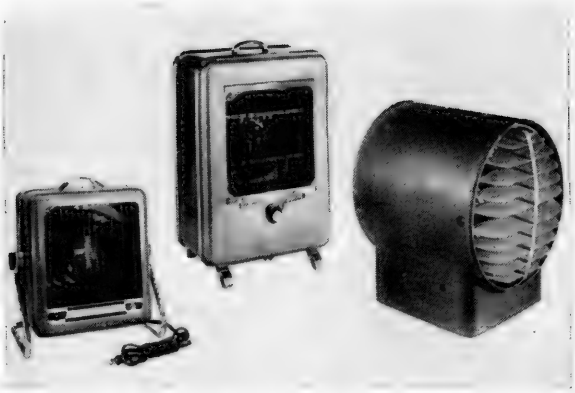
D. C. Seitz has been appointed district manager-commercial of **York Corp.'s** east central district, with headquarters in **Cleveland.** Mr. Seitz, who has been associated with York Corporation for 17 years, will head up a district organization of sales and service supervisors and a network of twenty-one York distributors in **Ohio, Pennsylvania, New York, West Virginia,** and **Kentucky.**

Kennard Corp., St. Louis, Mo., is enlarging its sales services by means of three additional offices. The new sales representatives are **R. C. Black Co., Rochester, N. Y.,** with a branch office in Buffalo; **R. E. Burden & Son, Rockford, Ill.;** and **A-T-M Gas Equipment Co., Jackson, Miss.**

J. A. Harwell, Nashville, Tenn., has been appointed representative for the **Connor Engineering Corp.** residential, ceiling air diffusers in eastern Tennessee. The **Norris Blanchard Co., Inc., Omaha, Neb.,** has been named representative for Iowa, Nebraska, and South Dakota.

Appointment of **Herbert B. Nechemias** to the position of manager of its **Cincinnati, Ohio,** electrical division branch office has been announced by **Wagner Electric Corp., St. Louis, Mo.** Mr. Nechemias was formerly manager of the company's industrial sales department.

Henry A. Bickel of the Spokane, Wash., branch of **Johnson Service Co.** has been transferred to the company's **Seattle** office. Bickel has been a Johnson sales engineer since 1947. A graduate of Ohio State University, he is a member and past president of the Inland Empire Chapter of the ASHAE.



Dependable, low-cost space heating where and when you need it

CHROMALOX Electric COMFORT HEATERS

You have a choice of blower, convection or radiant types of heating, all with Chromalox totally enclosed heating elements. Portable, mounted or built-in units—¼ to 40 kw. Automatic or manual controls.

Sizes and types for heating any size space—from a small spot or room to an entire building. Easy and economical to install and maintain.

Write for your copy of quick selector Catalog D-52 to get complete information on Chromalox Electric Comfort Heaters and their applications.

For information on the complete line of Chromalox Electric Heaters request Catalog 50.

Let the Chromalox Sales Engineering staff solve your heating problems... electrically

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centrifugal materials handling fans

New Aerovent "MH" Fans, designed primarily for use in conveying production and waste materials, are also effective for dust, fume and gas removal in foundries, mills and general industrial areas.

Available in 19", 26", 33", 40" and 51" wheel diameters, these units are adjustable for angular, horizontal or vertical air discharge and reversible for either clockwise or counter-clockwise rotation.

Standard units furnished less motors, belts, and sheaves. Appropriate drive units and accessory equipment available for all operating requirements.

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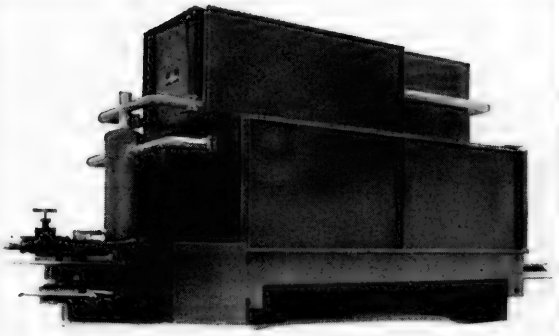

NIAGARA SECTIONAL *Aeropass* CONDENSER

gives you lower cost refrigeration, saves you ***LABOR,*** *Power, Water*

- **Because Niagara "Duopass" pre-cooling removes super-heat and gas condenses at lower temperature.**
- **Because the system is automatically purged of oil.**
- **Because the new design improves the heat transfer to the out-door air by evaporation.**
- **Because these features keep the condenser working for long life with "new plant" efficiency... always full capacity.**
- **Because you save 95% of cooling water cost.**

You save labor in upkeep. With full access to all parts and interior piping you see everything in easy inspections. You head off dirt accumulation and corrosion. Casing panels are removable without moving the coils. The coils can be cleaned from both sides.

First cost is low; freight is low because of the lowest space/weight ratio; you save much labor in erection. Capacity range is 90 to 240 tons. No other condensing method gives you so much saving in money and trouble.

Write for Niagara Bulletin 131.

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Dept. HV, 405 Lexington Avenue
NEW YORK 17, N. Y.

District Engineers in Principal Cities

NIAGARA *Over 40 Years' Service in Industrial Air Engineering*

Principles, Data and Procedure to Help You Analyze and Solve Industrial Ventilation Problems

PLANT and PROCESS VENTILATION

W. C. L. HEMEON

Data and procedure for engineers and students using principles developed from wide experience and extended by engineering analysis. Subjects covered include: Behavior of contaminants in air; materials handling enclosed processes; hot processes; general and local exhaust; air cleaning; duct, hood and booth design.

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CONTENTS

Objectives and General Considerations

Dynamic Properties of Airborne Contaminants

Airborne Dispersion

General Principles of Local Exhaust

Local Exhaust and Exterior Hoods

Control Velocities and X-Distance for Exterior Hoods

Air Flow Caused by Fragments

Canopy Hoods—Exhaust for Hot Processes

Characteristics of Free Air Jets

General Ventilation

Design of Duct System

Exhaust Systems for Dust

Evaluation and Control of Heat Exposures

Field Observations and Assembly of Design Data

Methods of Moving Air

Exhaust Air Cleaning

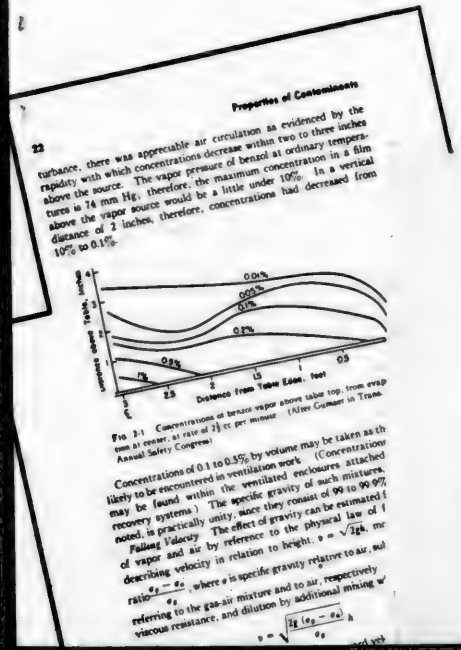
PROCESS VENTILATION

PLANT and PROCESS VENTILATION, by W. C. L. Hemeon, contains new, original conceptions of ventilation principles and practice that will enable you to analyze and solve all types of industrial ventilation problems. The author is Engineering Director of the Industrial Hygiene Foundation, and is thus eminently qualified to present this subject in a clear and comprehensive manner. His book differs from others on ventilation in that emphasis is placed on the estimating of ventilation quantities required in various industrial applications, while the subject of duct design, a well understood technique, has been simplified by condensation of design data.

PLANT and PROCESS VENTILATION provides you with design factors and data that can be applied to any situation. Principles are clearly set forth and lead logically to rules of procedure. Those principles which apply to exterior hoods and booths are extended to cover all ventilation and material transport situations. By the simple observation of a process, you can now estimate accurately the exhaust requirements of any cold, multi-directional process; and, with the necessary field data, refer to tables which summarize exhaust requirements for such a situation.

Presented for the first time is a theory for estimating air flow induced by motion of solid particles; for example, by falling motion, as in the handling of bulk materials. New principles derived by the author are found in the chapter on canopy hoods and exhaust for hot processes. The author presents a simplified method, easy to apply, for the design of air injectors, and a new development in connection with the design of natural draft ducts to carry away contaminated hot air and gases from canopy hoods and the like. Also treated is the problem of ventilating large mill buildings that house processes releasing massive quantities of heat. A complete analysis of the behavior of roof ventilators and air currents within a building is presented so that the plant engineer can analyze a particular problem and explain the frequently anomalous behavior of large-scale ventilation currents.

If you are an engineer, a contractor, or a student interested in industrial ventilation, here is a book that is a *must* for your technical library. PLANT and PROCESS VENTILATION will serve you well as a valuable, comprehensive, time-saving reference book on all your industrial ventilation problems.


Properties of Contaminants
22
turbance, there was appreciable air circulation as evidenced by the rapidity with which concentrations decrease within two to three inches above the source. The vapor pressure of benzol at ordinary temperatures is 74 mm Hg, therefore, the maximum concentration in a film above the vapor source would be a little under 10%. In a vertical distance of 2 inches, therefore, concentrations had decreased from 10% to 0.1%.
0.01%
0.05%
0.1%
0.2%
0.5%
1%
2.5
2
1.5
1
0.5
Distance from Table Edge, feet
Concentrations of benzol vapor above table top, from evaporation at center, at rate of 2½ cc per minute. (After Guzman in Trans. Annual Safety Congress)
Concentrations of 0.1 to 0.5% by volume may be taken as th
likely to be encountered in ventilation work. (Concentrations
may be found within the ventilated enclosures attached
recovery systems.) The specific gravity of such mixtures,
noted, is practically unity, since they consist of 99 to 99.9%
Falling Velocity. The effect of gravity can be estimated f
of vapor and air by reference to the physical law of
describing velocity in relation to height, v = √2gh, m
ratio (σg − σa)/σa, where σ is specific gravity relative to air, sul
referring to the gas-air mixture and to air, respectively
viscous resistance, and dilution by additional mixing w
v = √(2g (σg − σa)/σa h)

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Canadian Degree Days for January, 1956*

City	January		December	
	1956	Normal	1955-56	Normal
Calgary, Alta.	1808	1609	6576	5311
Charlottetown, P. E. I.	1124	1463	4266	4328
Crescent Valley, B. C.	1207	1352	4793	4631
Edmonton, Alta.	2067	1814	7051	5798
Fort William, Ont.	1657	1807	5616	5622
Grande Prairie, Alta.	2313	1841	7772	6000
Halifax, N. C.	991	1283	3674	3898
London, Ont.	1302	1336	4083	4013
Medicine Hat, Alta.	1797	1643	6128	5032
Moncton, N. B.	1199	1528	4554	4714
Montreal, P. Q.	1415	1552	4570	4648
North Bay, Ont.	1661	1658	5385	5161
Ottawa, Ont.	1481	1646	4791	4923
Penticton, B. C.	1083	1184	4154	3810
Prince George, B. C.	1900	1615	6823	5372
Quebec City, P. Q.	1383	1696	4963	5207
Regina, Sask.	1989	2037	6892	6373
St. John, N. B.	1169	1417	4399	4386
Saskatoon, Sask.	2095	2027	7107	6276
Timmins, Ont.	1852	1944	6018	6084
Toronto, Ont.	1248	1304	3778	3948
Vancouver, B. C.	852	893	3304	3061
Victoria, B. C.	809	815	3254	2725
Windsor, Ont.	1221	1283	3688	3729
Winnipeg, Man.	1951	2111	6438	6316

*These data are supplied through the courtesy of the Meteorological Division Air Service Branch, Department of Transport, Canada.

The Department reports a slight revision in the figures for December, as published in last month's issue. Corrected figures is: Charlottetown, P.E.I., 1400.

COMING EVENTS

Where listed, names or titles of individuals are those from whom further information is available.

INDUSTRIAL ENGINEERS CONFERENCE—Fifth annual spring conference of the American Institute of Industrial Engineers (Cleveland Chapter), to be held in Cleveland. W. S. Ritchie, Room 330, Cuyahoga Savings Building, 2123 E. 9th St., Cleveland 15, Ohio. ..... **MARCH 15-16, 1956.**

ASME MEETING—Spring meeting of the American Society of Mechanical Engineers, at the Multnomah Hotel, Portland, Ore. C. E. Davies, secretary of the Society, 29 W. 39th St., New York, N. Y. ..... **MARCH 18-21, 1956.**

POWER CONFERENCE—18th annual American Power Conference, at the Hotel Sherman, Chicago, Ill., sponsored by Illinois Institute of Technology, 25 W. 23rd St., Chicago, Ill. ..... **MARCH 21-23, 1956.**

FORCED WARM AIR CONFERENCE—25th annual Forced Warm Air Conference, sponsored jointly by Michigan State University and the National Warm Air Heating and Air Conditioning Association, to be held at Kellogg Center, Michigan State University, East Lansing, Mich. George Boeddener, managing director of the Association, 145 Public Square, Cleveland 14, Ohio. ..... **APRIL 2-5, 1956.**

LUBRICATION ENGINEERS MEETING—Annual meeting of the American Society of Lubrication Engineers, at the William Penn Hotel, Pittsburgh, Pa. Secretary of the Society, 343 So. Dearborn St., Chicago, Ill. ..... **APRIL 4-6, 1956.**

ENVIRONMENTAL TESTING MEETING—Second annual meeting of the Science Section of the Environmental Equipment Institute, at the Sheraton Hotel, Chicago, Ill. H. F. Sander, meeting chairman, Vapor Heating Corp., 6420 W. Howard St., Chicago, Ill. ..... **APRIL 16-20, 1956.**

GAMA MEETING—Annual meeting of the Gas Appliance Manufacturers Association, at The Greenbrier, White Sulphur Springs, West Virginia. H. Leigh Whitelaw, managing director of the Association, 60 E. 42nd St., New York, N. Y. ..... **APRIL 19-21, 1956.**

INDUSTRIAL HEALTH CONFERENCE—Annual meeting of five groups, including the American Industrial Hygiene Association, at Convention Hall, Philadelphia, Pa. Si Shalltz, Adelphia Associates, Western Saving Fund Bldg., Philadelphia 7, Pa. . . . . **APRIL 21-27, 1956.**

LIQUEFIED PETROLEUM GAS SHOW—Convention and trade show of the Liquefied Petroleum Gas Association, at the Conrad Hilton Hotel, Chicago, Ill. R. E. Borden, director of publicity of the Association, 11 S. LaSalle St., Chicago 3, Ill. . . . . **MAY 6-9, 1956.**

AIR CONDITIONING AND REFRIGERATION MEETING—Annual meeting of the Air Conditioning and Refrigeration Institute, at The Homestead, Hot Springs, Va. Secretary of the Institute, 1346 Connecticut Ave., N. W., Washington 6, D. C. . . . . **MAY 7-9, 1956.**

DESIGN ENGINEERING SHOW—First Design Engineering Show, held in conjunction with a conference on design engineering sponsored by the American Society of Mechanical Engineers, at Convention Hall, Philadelphia, Pa. Clapp & Poliak, Inc., 341 Madison Ave., New York 17, N. Y. . . . . **MAY 14-17, 1956.**

MECHANICAL CONTRACTORS MEETING—Annual meeting of The Mechanical Contractors Association of America (formerly, Heating, Piping and Air Conditioning Contractors National Association), at The Brown Hotel, Louisville, Ky. Secretary of the Association, 1250 Avenue of the Americas, New York 20, N. Y. . . . . **MAY 15-18, 1956.**

ASRE MEETING—52nd annual meeting of the American Society of Refrigerating Engineers, at the Sheraton-Gibson Hotel, Cincinnati, Ohio. R. C. Cross, secretary of the Society, 234 5th Ave., New York 1, N. Y. . . . . **JUNE 3-6, 1956.**

NDHA MEETING—47th annual meeting of the National District Heating Association, at the Inn and Lodge, Williamsburg, Va. J. F. Collins, Jr., secretary-treasurer of the Association, 827 N. Euclid Ave., Pittsburgh, Pa. . . . . **JUNE 4-7, 1956.**

PLUMBING AND HEATING EXPOSITION—1956 National Plumbing and Heating Exposition, in conjunction with the 74th meeting of the National Association of Plumbing Contractors, Inc., to be held in the Milwaukee Auditorium, Milwaukee, Wis. Secretary of the Association, 1016 20th, N. W., Washington, D. C. . . . . **JUNE 11-14, 1956.**

OIL-HEAT SHOW—21st National Oil-Heat and Air Conditioning Exposition, at the new Coliseum, New York, N. Y., to be held concurrently with the 34th Annual OHI Convention of the Oil-Heat Institute of America, with headquarters at the Park Sheraton Hotel, New York. R. H. L. Becker, managing director of the Institute, 500 Fifth Ave., New York 36, N. Y. . . . . **JUNE 11-16, 1956.**

ASME MEETING—Semi-annual meeting of The American Society of Mechanical Engineers, at the Hotel Statler, Cleveland, Ohio. Secretary of the Society, 29 W. 39th St., New York, N. Y. . . . . **JUNE 17-21, 1956.**

TESTING MATERIALS MEETING—59th annual meeting of the American Society for Testing Materials, at the Chalfonte-Haddon Hall, Atlantic City, N. J. Secretary of the Society, 1916 Race St., Philadelphia 3, Pa. . . . . **JUNE 17-22, 1956.**

ASHAE MEETING—Semi-annual meeting of the American Society of Heating and Air-Conditioning Engineers, Inc., at the Shoreham Hotel, Washington, D. C. A. V. Hutchinson, secretary of the Society, 62 Worth St., New York 13, N. Y. . . . . **JUNE 18-20, 1956.**

INSTRUMENT SOCIETY EXHIBIT—11th annual Instrument-Automation Conference and Exhibit (International), of the Instrument Society of America, at the new Coliseum building, New York, N. Y. J. McCaffery, assistant executive secretary of the Society, 1319 Allegheny Ave., Pittsburgh 13, Pa. . . . . **SEPTEMBER 17-21, 1956.**

ASME MEETING—Annual meeting of the American Society of Mechanical Engineers, Hotel Statler, New York, N. Y. Secretary of the Society, 29 W. 39th St., New York, N. Y. . . . . **NOVEMBER 25-30, 1956.**

HEATING AND AIR CONDITIONING EXPOSITION—1957 International Heating & Air-Conditioning Exposition, under the auspices of the American Society of Heating and Air-Conditioning Engineers, Inc., to be held at International Amphitheater, Chicago, Ill. E. K. Stevens, manager, International Exposition Co., 480 Lexington Ave., New York 17, N. Y. . . . . **FEBRUARY 25-MARCH 1, 1957.**

METALS CONGRESS AND EXPOSITION—10th Western Metal Congress and Exposition, sponsored by the American Society for Metals, and other technical groups, at the Pan-Pacific Auditorium and the Ambassador Hotel, Los Angeles, Calif. W. H. Eisenman, managing director of the Society, 7301 Euclid Ave., Cleveland 3, Ohio. . . . . **MARCH 25-29, 1957.**

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NEW CATALOGS

Use the prepaid postcard on page 125 for securing your copies of catalogs described in this department.

AIR CONDITIONING CATALOG—Fan-coil units for hot and chilled water systems are illustrated in a catalog issued by National-U. S. Radiator Corp., Johnstown, Pa. The dimensions and nominal capacities of both console and concealed units are listed by the catalog. ..... **Item 69**

INDUSTRIAL FAN CATALOG—A 72-page, illustrated catalog (Bulletin 5306) describing the Series 106 industrial fans is available from American Blower Corp., Detroit, Mich. Rating table terminology, ordering data, and operating limits are discussed. Selections based on the constant pressure method as well as cold static method are covered, and 50 pages of ratings for the various wheel types and sizes are included. ..... **Item 70**

FLEXIBLE FITTINGS CATALOG—A catalog on flexible compression fittings is published by Dresser Mfg. Div., Bradford, Pa. The 12-page brochure, illustrated both by photographs and drawings, describes the uses of the fittings on steel piping and copper tubing. ..... **Item 71**

PACKAGED COOLING-HEATING—Packaged cooling and heating equipment for homes, stores, shops, offices, and industry is the subject of a bulletin (No. C-1100-B65) issued by Worthington Corp., Harrison, N. J. The 12-page bulletin contains information about the features, dimensions, and capacities of various types of heating and cooling equipment. Also available are specification sheets for some of the company's new air-cooled line of equipment and a year-round air conditioner. ..... **Item 72**

BROCHURE ON ELECTRIC MOTORS—A line of electric motors is the subject of a two-color bulletin (No. 1700) published by The Louis Allis Co., Milwaukee, Wis. The brochure includes photos and information on the new open drip-proof, as well as enclosed and explosion-proof, electric motors manufactured to the new NEMA standards. More than twenty large sized photographs, including cut-away views, and ten explanatory technical drawings and graphs provide the reader with essential data on performance and application features. ..... **Item 73**

SUBZERO TUBING FOLDER—Engineers and others involved with the design of modern process equipment involving the use of tubing are offered a six-page folder by Tubular Products Div., The Babcock & Wilcox Co., Beaver Falls, Pa. The bulletin, TB-357, gives information pertaining to tubular products intended for subzero temperature applications. ..... **Item 74**

PACKAGED BOILER CATALOG—Packaged water tube boilers are described in a 12-page catalog (119-D) revised by Superior Combustion Industries, Inc., New York, N. Y. Data and dimensions are included for boilers ranging from 8000 to 50,000 lb of steam per hr, firing oil or gas, or both. ..... **Item 75**

(*Continued on page* 174)

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LARGE CAPACITY

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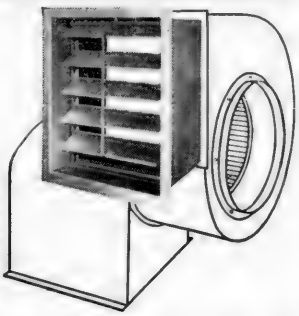

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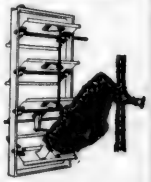

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Built solid and tough, designed for easy maintenance. Free from vibration and quiet running. All important adjustments and controls are on the outside within easy sight and reach.

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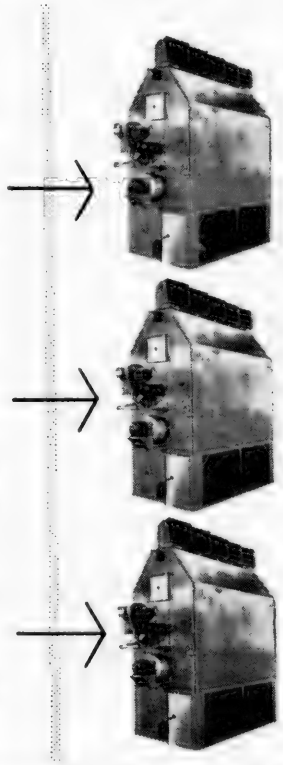
An important feature that eliminates cold air blasts at every start—allows separate control between main blowing fans and exhaust.



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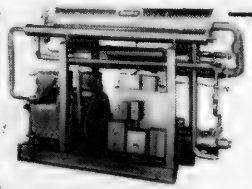

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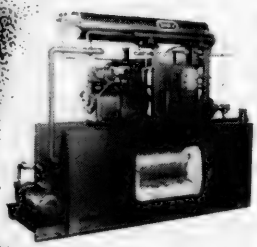
For broad range of air conditioning, refrigeration and industrial liquid chilling applications. Models from 2 to 75 H.P.



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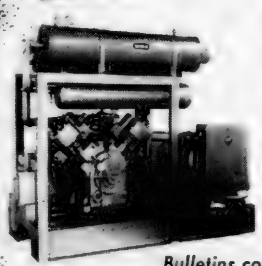
'RPC' Residential Package Chiller
For domestic applications. Available in 2, 3 and 5 H.P. models. Hermetic Compressors. 230/1/60.



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Air cooled units available in 2, 3 and 5 H.P. models. For residential and other applications where air cooled condensing is necessary.

Bulletins containing specifications FREE on request

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NEW CATALOGS

(*Continued from page* 172)

Use the prepaid postcard on page 125 for securing your copies of catalogs described in this department.

SOUND CONTROL FOLDER—A four-page folder (No. WAF-1), describing Microlite and Super-Fine glass fiber insulation for heat control and sound absorption, is released by L. O. F. Glass Fibers Co., Toledo, Ohio. The literature gives performance and conductivity charts for the insulating blankets and describes their properties and uses for acoustical applications and air duct installations. ----------**Item 76**

DIAPHRAGM VALVE BULLETIN—Diaphragm valves made of chemically resistant, unplasticized polyvinyl chloride are described by a bulletin offered by Industrial Div., Colonial Plastics Mfg. Co., Cleveland, Ohio. Recommended working pressures, mechanical, electrical, and thermal properties of the valves are given in the bulletin in addition to the chemical resistance properties. ----------**Item 77**

SOFT WATER MANUAL—Because of the needs of consulting and mechanical engineers, whose written plumbing specifications include water softeners, an 85-page manual on water softeners and filters has been compiled and is made available by Bruner Corp., Milwaukee, Wis. The manual covers heavy duty, industrial and home water softeners and chemical feed pumps. It includes fill-in type specifications of the largest as well as the smallest types, and the single valve, automatic, or fully automatic types. ----------**Item 78**

VIBRATION HANGER CATALOG—A line of high deflection, heavy-duty vibration hangers is described in Catalog No. VH-55 issued by T. R. Finn & Co., Inc., Hawthorne, N. J. The catalog describes two types of vibration hangers. Dimensions and specifications, installation instructions and the company's engineering services are also described. ----------**Item 79**

PLASTIC PIPE FOLDERS—A folder with reference information for the proper selection of unplasticized, rigid PVC pipe is released by Alpha Plastics Inc., West Orange, N. J. The two types, Alpha 101 and 102, are described together with charts showing their properties. A companion folder describes threaded and socket solvent cement fittings recommended for use with the pipe. ----------**Item 80**

TEMPERATURE RISE CHART—A temperature rise chart for the WH Series twin tankless volume water heaters is issued by Portmar Boiler Co., Brooklyn, N. Y. The chart shows, at a glance, the degree rise in gallons per hour for single and dual hot water temperatures. It is designed to show degree rise for the company's line of volume water heaters. ----------**Item 81**

PERIMETER HEATING CATALOG—Packaged baseboard assemblies for hot water heating are described and illustrated in a catalog available from National-U. S. Radiator Corp., Johnstown, Pa. The capacities of the units are listed and the installation procedure is illustrated and described in the catalog. ----------**Item 82**

AUTOMATIC CONTROLS CATALOG—A 52-page catalog (No. 856) of automatic controls for heating, refrigeration, air conditioning, and industrial applications is published by the Mercoid Corp., Chicago, Ill. The catalog has two indices: one lists the controls by name, the other lists the controls by company number. ----------**Item 83**

VALVE CIRCULAR—Of interest to those who buy, specify, or use valves is a circular, prepared by Lunkenheimer Co., Cincinnati, Ohio, illustrating and describing its new line of five bronze, solder-end valves. Copies of the circular can be obtained on request. ----------**Item 84**

FUEL GAGE BOOKLET—A booklet (Bulletin 546) covering capacitor type, fuel gaging systems is available from The Liquidometer Corp., Long Island City, N. Y. The booklet describes true weight gaging systems, compensated and uncompensated capacitor type fuel gages, repeater indicators, fuel gage totalizing systems, selective indicators, and thermistor applications for fuel level warning and control. ----------**Item 85**

STEEL FITTINGS CATALOG.—Engineering data and dimensional information on forged stainless and alloy steel fittings is contained in an 8-page bulletin, S-1-55, published by Watson-Stillman Fittings Div., H. K. Porter Co., Inc., Roselle, N. J. The alloys covered include types 304, 316 and 304 L stainless steel; 1¼% chromium—½% molybdenum steel; 2¼% chromium—1% molybdenum steel; and 4-6 chrome—½% moly fittings. ----------**Item 86**

TRAILER BULLETIN—A bulletin announcing a 17-ft storage trailer is issued by International Trailer Co., Inc., Baltimore, Md. In addition to listing the specifications of the trailer, the bulletin also describes the various applications for the trailer. ----------**Item 87**

FOLDER ON PIPE CUTTERS—A folder covering the application of manually operated cutters to field cutting asbestos-cement pipe is issued by Pilot Mfg. Co., Torrance, Calif. The folder contains data and illustrations on a large cutter which cuts sizes up to 20-in. nominal pipe size and a junior model for both pressure-pipe and flue-pipe in sizes through 6-in. nominal. ----------**Item 88**

MANUAL ON RADIATOR HEATING—Current technical information on ratings, data and dimensions of radiator heating products is included in a manual (Form No. 205-2) being distributed by Plumbing and Heating Div., American Radiator & Standard Sanitary Corp., Pittsburgh, Pa. The manual replaces the 1952 edition (Form No. 220 Rev.). An index in the front of the manual provides references to the product sections. ----------**Item 89**

DIRECT WATER HEATING—The advantages of direct, gas-fired, storage-type water heaters in providing domestic hot water for multiple dwellings are set forth in a self-mailer, Form 982, available from Ruud Mfg. Co., Kalamazoo, Mich. Prepared to be sent to builders, owners, and managers of multiple dwellings, the mailing piece has space on its front for an address and postal mark. The back cover is for the imprint of the plumbing contractor, gas company, LP-gas distributor, or other retailer. ----------**Item 90**

(Concluded on page 176)

COOLING TOWER NEWS

Here's why Chicago's Hotel LaSalle chose a Binks tower—19 years later!

Last summer Chicago's Hotel LaSalle air conditioned its public rooms. To cool the large compressors the hotel purchased a 350-ton capacity Binks cooling tower...and for good reason:

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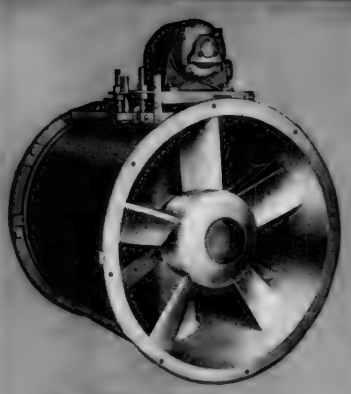
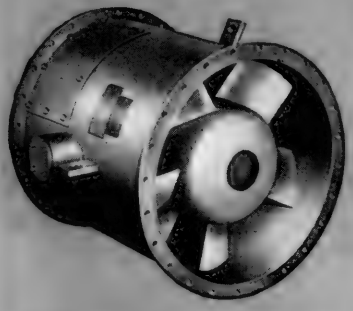
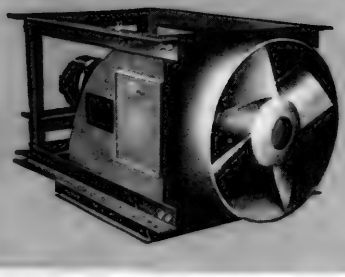


WINGFOIL Straight-Line Duct Fan forms part of run of duct. V-belt drive through air tube. Motor on adjustable platform is outside air stream. Sizes: 21" to 60". Capacities to 95,000 CFM, pressures to 2" s.p.



WINGFOIL Vaneaxial Duct Fan. Direct connected motor inside casing. Motor is totally enclosed with sealed bearings. Sizes: 10" to 42". Capacities on application.



WINGFOIL Elbow Type Duct Fan forms elbow in duct system. Strong rectangular frame. Motor outside air stream. Direct or V-belt drive. Mount in any position. Sizes: 10" to 60". Capacities up to 85,000 CFM, pressures to 2" s.p.

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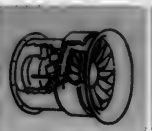
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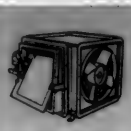
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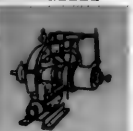

TURBINES

NEW CATALOGS

(*Concluded from page 175*)

MANUAL ON V-BELT CARE—A 14-page, illustrated, manual on the care and maintenance of industrial V-belts is published by The B. F. Goodrich Co., Industrial Products Div., Akron, Ohio. The manual covers the following topics: designing the new drive; double matching; installation of belts; how V-belts grip; importance of tension; drive alignment; how to clean; and storage. ..... **Item 91**

BOILER FOLDER—A folder describing cast iron boilers for the heating and domestic hot water requirements of medium to large size residential installations is available from National-U. S. Radiator Corp., Johnstown, Pa. Capacities and engineering data for domestic water heaters are given in addition to ratings for automatic and hand fired boilers. ..... **Item 92**

PLUMBING FIXTURE PRICES—An 18-page, illustrated list price booklet for plumbing fixtures is available from Gerber Plumbing Fixtures Corp., Chicago, Ill. Because all fixtures are illustrated and consumer prices shown, the booklet is used as a consumer sales piece as well as for plumbing jobbers. ..... **Item 93**

SHOWER HEAD CATALOG—A catalog (A. I. A. 29-H-3) illustrating and describing shower heads is offered by Sloan Valve Co., Chicago, Ill. The catalog lists the variations that have been added to the standard and institutional types of shower heads. Flush valve operated shower heads and spray heads with goosenecks for hospital wash-up sinks and public lavatories are also illustrated. ..... **Item 94**

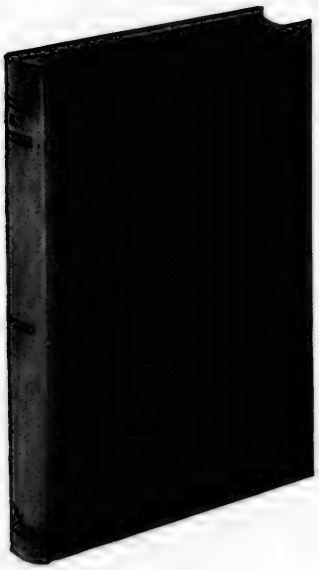
LOW TEMPERATURE BRAZING—A folder describing low temperature brazing applications and developments is issued by Handy & Harman, New York, N. Y. The folder describes and illustrates recent applications of low temperature brazing in buildings and piping. ..... **Item 95**

GRILLE SELECTION TABLE—A grille size selection table is offered to engineers and contractors by Waterloo Register Co., Inc., Waterloo, Iowa. The 6-page table includes instructions for its use and a return air selection table. ..... **Item 96**

WELDING FITTINGS FOLDER—Engineers in the chemical industry, in refinery and power construction, and maintenance and piping contractors are offered a folder by Tubular Products Div., The Babcock & Wilcox Co., Beaver Falls, Pa. The 6-page folder, identified as FB-500, gives the types and size ranges of various welding fittings and flanges which can be furnished by the division. ..... **Item 97**

GAS BURNER BULLETIN—A gas conversion burner for furnaces or boilers is described by a bulletin published by National-U. S. Radiator Corp., Johnstown, Pa. The components of the burners, their dimensions and ratings are listed by the bulletin. ..... **Item 98**

Use the prepaid postcard on page 125 for securing your copies of catalogs described in this department.



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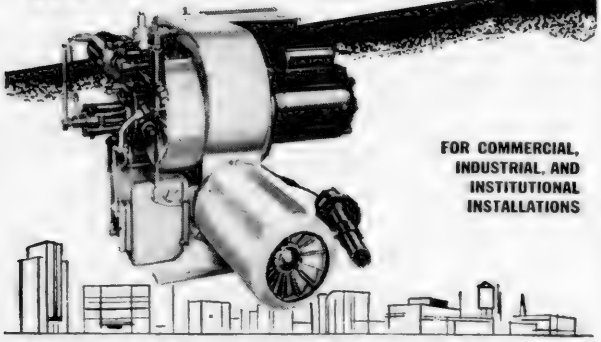

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(*Concluded from page* 162)

Industrial Axial and Propeller Fan Division; Power Roof Ventilator Division; Residential Fan Division; Unit Heater Division.

• **OFFICIALS.**—The officers elected for the ensuing year are as follows: President. R. W. Nelson of American Air Filter Co., Inc., Louisville, Ky.; Vice-President, J. F. Snow of Davidson Fan Co., Newton, Mass.; Vice-President, C. C. Cheyney of Buffalo Forge Co., Buffalo, N. Y.; and Secretary-Treasury, W. H. Rietz of Ilg Electric Ventilating Co., Chicago, Ill. In addition to the officers, the following directors were elected: M. L. Aitken of Robbins and Myers, Inc., Springfield, Ohio; H. F. Brinen of Young Radiator Co., Racine. Wis.; R. W. McMahon of Modine Mfg. Co., Racine, Wis.; C. E. Reed of Reed Unit-Fans Inc., New Orleans, La.; and W. Rutter of Burt Mfg. Co., Akron, Ohio.

The Association headquarters, located in Detroit, will be under the direction of L. O. Monroe, Executive Vice-President, assisted by Robert E. O'Rourke.

COAL RETAILERS

to organize campaign to help landlords install central heating in New York City multiple dwellings.

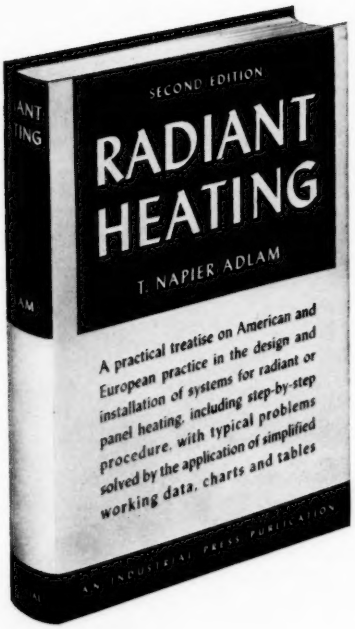
Metropolitan New York coal retailers met this winter to organize "Operation Central Heat" designed to assist building operators to comply in the most economical way, with the new city housing regulations which will require installations of central heating in all multiple dwellings. The meeting was sponsored by the New York State Fuel Merchants Association. Representatives of the Anthracite Information Bureau and American-Standard Corp., which is cooperating in the drive, addressed approximately one hundred coal men in attendance.

New York City law now requires owners to install central heat in all apartment buildings with ten or more families by November 1957 and in houses with less than ten families by November 1958. It is estimated that more than 5000 buildings are effected by the law.

• **SPEED URGED.**—Speakers pointed out that besides the safety factor resulting from elimination of kerosene heaters, it is economically sound for owners to make their central heating installations as soon as possible. Since mandatory rent increases, along with tax abatements, are allowed landlords with the new services, the sooner central heating is installed, the sooner will it be amortized and begin making money for the owner out of increasing revenues.

Norman C. Curtin, consulting engineer of the Anthracite Information Bureau, cited figures which showed that an inexpensive installation for most presently unheated apartment buildings is a coal furnace hand-fired under natural draft. He also pointed to charts showing that a central coal heating system in an average ten family building will pay for itself out of rent increases in the third heating season.

Here is a Book You Cannot Afford to be Without!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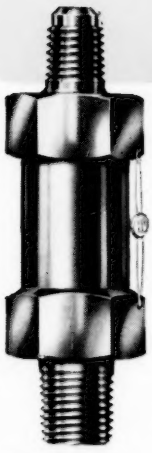
HENRY ASME relief valves

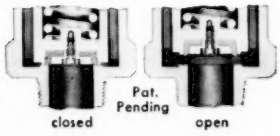
for Extra Capacity Extra Safety



Type 523 Straight-Through Relief Valves

FOR FREON AND SIMILAR REFRIGERANTS

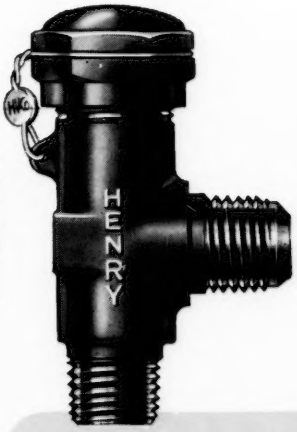
This relief valve has the Henry "Controlled Cushion" cup seat disc construction which prevents deformation of sealing ring and assures consistent operation. This design provides positive relief at predetermined set pressures. Brass construction. Sizes (inlet x outlet) ½" M.P.T. x ⅝" Flare; ½" F.P.T. x ½" F.P.T.; ¾" F.P.T. x ¾" F.P.T.; and 1" F.P.T. x 1" F.P.T.



"Controlled cushion" cup seat disc construction

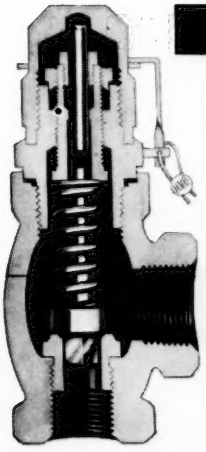
Type 52 Angle Relief Valve

This forged brass valve is available in sizes (inlet x outlet) ½" M.P.T. x ⅝" Flare and ⅜" O.D.S. x ⅜" O.D.S.



ASME
NB National Board Certified

All Henry Relief Valves in the sizes and types listed below are constructed in accordance with the standards of the ASME. In addition these valves are stamped NB to indicate National Board Certification as to capacities.



FOR AMMONIA

Angle Relief Valve

Has soft metal alloy seat and push rod for emergency reseating. Stainless steel trim. Sizes (inlet x outlet) ½" F.P.T. x ¾" F.P.T.; ¾" F.P.T. x 1" F.P.T.; and 1" F.P.T. x 1¼" F.P.T.

All the above valves can be furnished at any desired pressure setting in the range of 50-350 P.S.I.

Write us for data sheet #AE-1303 showing new increased capacity ratings of these Henry relief valves.

See your Henry wholesaler for these certified relief valves.

HENRY VALVE CO.

Melrose Park, Ill. (Chicago Suburb)
Cable: HEVALCO, MELROSE PARK, ILLINOIS

Specialized Manufacturers of the Complete Line of Relief Valves for Refrigeration and Air Conditioning

HENRY VALVE CO. CONTROLLING FLOW SINCE 1914

THE ONE BEST SAFETY RELIEF!

for BIG hot water space heating boilers

230 M-1
Boiler size up to 1,488,000 Btu./hr. ¾" valve opens at 30 psi. 1½" valve opens at 36 psi.

230 M-2
Boiler size up to 1,928,400 Btu./hr. 1" valve opens at 30 psi. 1½" valve opens at 36 psi.

"Progressive settings" do the job!

Look at these dual relief valves in the McDonnell 230 series. They give you the Btu-rated, code-approved relief capacity required for big hot water space heating boilers . . . but they give you something more that can't be had in any other valves.

This something more is *progressive settings.* The smaller (primary) valve is set to open at the maximum hot water heating boiler pressure of 30 psi. The larger (secondary) valve is set to open at a slightly higher pressure—at 36 psi. This progressive setting is an exclusive McDonnell development that can eliminate a lot of service problems . . . and we'll tell you why:—

Notice "Operation Normal" The small valve, set at 30 psi, will take care of the duties of discharging excess water and reducing increased pressures due to causes such as thermal expansion, over-filling or pump impulse pressure. But since it is a relatively small valve it doesn't open up a big discharge as a large valve would. When a large valve opens, it really goes to town, as you know, and has more difficulty reseating tightly—a drawback that can lead to service calls and problems.

But now Notice "Operation Emergency" If an emergency high pressure condition occurs, the big valve opens with a pressure increase of only six pounds . . . and the combined capacity of both valves goes to work immediately.

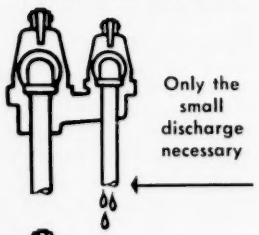
The principle of progressive settings complies with the ASME boiler code. The valves used in the 230 M-1 and the 230 M-2 are the McDonnell 230 series valves which conform to ASME boiler code requirements and have been tested and rated by the National Board of Boiler and Pressure Vessel Inspectors.

Use the smaller 230 series valves (opposite) for the smaller boilers; and remember that best modern practice dictates McDonnell boiler water level controls on hot water space heating boilers. Ask for complete information.

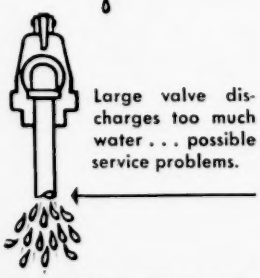
McDONNELL & MILLER, Inc.
3500 N. Spaulding Ave., Chicago 18, Ill.

Doing One Thing Well

OPERATION: NORMAL

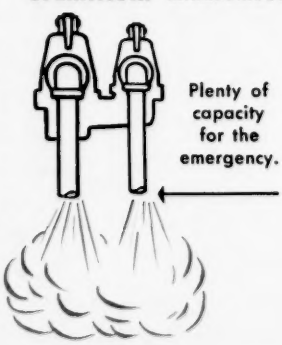


Only the small discharge necessary

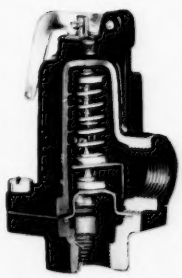


Large valve discharges too much water . . . possible service problems.

OPERATION: EMERGENCY



Plenty of capacity for the emergency.



McDONNELL 230 Series
your kind of relief valve—

Ingenious design and ultra-modern manufacturing methods have combined to give you a thoroughly dependable relief valve at a modest price in the McDonnell 230 series.

Interior operating parts are all non-ferrous materials. Valve seat is brass; valve disc, durable Silicone. An outstanding feature is the independent action of the testing lever. Even tying it down does not interfere with the automatic functioning of the valve.

Tested, rated and approved, the name-plate of every series 230 valve carries these symbols:

V NB A.S.M.E. UV

McDONNELL *Low Safety Relief*